D 92205 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Printing Technology Engineering

PT 14 506—ELECTRICAL DRIVES AND CONTROL

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the static V-I characteristics of an SCR.
2. Draw the turn-off characteristics of an SCR and explain the mechanism of turn-off.
3. Explain the various methods of turn ON of an SCR.
4. Describe the working of a single-phase full converte in the rectifier mode with RLE load.
5. An RL load is fed from single-phase supply through a Thyristor. Derive an expression for load current in terms of R, L.
6. Explain the four quadrant operation of an electric drive.
7. Explain the operation of armature control of a DC shunt motor.
8. Explain in detail the various methods of speed contrcl in DC motor.
9. Deduce a condition for steady-state stability for drive sytem. Can the condition deduced be applied to synchronous motor drive ?
10. Write short notes on self-controlled synchronous motor drive.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. A single-phase half-wave SCR circuit feeds power to a resistive load. Draw waveforms for Source voltage, load voltage, load current and voltage across the SCR for a given firing angle 'α'. Hence obtain expressions for average and R.M.S. load voltages in terms of source voltage and firing angle.

Or

12. Explain the operation of IGBT with the help of neat structural diagram and suitable wave forms.

Turn over

13. Describe the operation of single-phase full wave A.C. voltage controller with the help of voltage and current waveform. Also derive the expression for average value of output voltage.

Or

14. (a) Discuss the principle of operation of DC-DC step down chopper with suitable waveforms and derive an expression for its average DC output voltage.

(8 marks)

(b) Describe the working principle of single-phase ac voltage controller with circuit and waveform.

(7 marks)

15. (a) What are the differences between the rectifier control of a dc shunt and dc series motors ? What are the advantages of dual converters in electric drives ?

(10 marks)

(b) Deduce an expression for the energy lost during starting of DC shunt motor with constant load torque T_L.

(5 marks)

Or

16. (a) Develop a criteria for evaluating the steady-state stability of an electrical drive.

(8 marks)

(b) Discuss the different modes of operation of an electrical drive. (7 marks)

17. (a) What is the basic difference between true synchronous mode and self-control mode for variable frequency control of synchronous motor ?

(10 marks)

(b) State and explain the roles of a damper winding in a synchronous motor. (5 marks)

Or

18. (a) Explain any one slip power recovery scheme for the control of three-phase induction motor drive. Can super synchronous speeds be achieved through it. Explain.

(10 marks)

(b) Why stator voltage control is an inefficient method of induction motor speed control ?

(5 marks)

[4 × 15 = 60 marks]

D 92204 **(Pages : 3)** **Name**.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology Engineering

PT 14 505—THEORY OF MECHANISM

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Define Mechanism, Kinematic pair, Inversion, Machine and Chain.
2. Differentiate between a) Base circle and prime circle ; and b) Cam angle and pressure angle.
3. With neat sketches explain the working principle of Oldham's coupling. List its applications.
4. A pair of involute spur gears with 16° pressure angle and pitch of module 6 mm is in mesh. The number of teeth on pinion is 16 and its rotational speed is 240 r.p.m. When the gear ratio is 1.75, find in order that the interference is just avoided : (a) Addendum on the gear ; and (b) Contact ratio, if the addendum is same on both the gears.
5. With a neat sketch explain the Compound gear train and mention its use.
6. What is a differential gear of an automobile ? How does it function ?
7. Explain static balancing and dynamic balancing. Mention their applications.
8. With standard notations, for a flat belt prove, $T_1/T_2 = e^{\mu\theta}$.
9. Explain any *two* types of vibration.
10. What are the causes and effects of vibration ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. (a) The crank of a slider crank mechanism rotates at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.

Or

(b) A cam with 20 mm as minimum diameter is rotating clockwise at a uniform speed of 1300 r.p.m. and operates a roller follower of 15 mm diameter. Outward stroke is of 30 mm during 120° of cam rotation with equal acceleration and retardation. Follower is to dwell for 55° of cam rotation. Inward stroke during 90° of cam rotation with equal uniform acceleration and retardation. Follower is to dwell for the remaining period of cam rotation. Draw the cam profile if the axis of follower passes through the axis of the cam. Determine the maximum velocity and acceleration during outward and inward strokes.

12. (a) In an epicyclic gear train, the internal wheels A, B and the compound wheels C and D rotate independently about axis O. The wheels E and F rotate on pins fixed to the arm G. E gears with A and C and F gears with B and D. All wheels have the same module and number of teeth are TC = 28 ; TD = 26 ; TE = TF = 18.

a) Sketch the arrangement ;

b) Find the number of teeth on A and B ;

c) If arm G makes 100 r.p.m. clockwise and A is fixed, find speed B ; and

d) If arm G makes 100 r.p.m. clockwise and wheel A makes 10 r.p.m. counter clockwise, find the speed of wheel B.

Or

(b) Two mating involute spur gears with module pitch of 8 mm have 23 and 57 teeth of 20° pressure angle. The addenda on pinion and gear wheel are equal to one module. Find :

i) Number of pair of teeth in contact ; and

ii) Maximum velocity of sliding.

Explain the advantages of Helical gear over Spur gear.

13. (a) An open belt running over two pulleys 24 cm and 60 cm diameters connects two parallel shafts 2000 mm apart and transmits 3.75 kW from the smaller pulley that rotates at 300 r.p.m ; co-efficient of friction between the belt and the pulleys is 0.35 and the allowable working tension in 100 N/cm width. Determine :

1) Minimum width of the belt ;
2) Initial belt tension ; and
3) Length of the belt required.

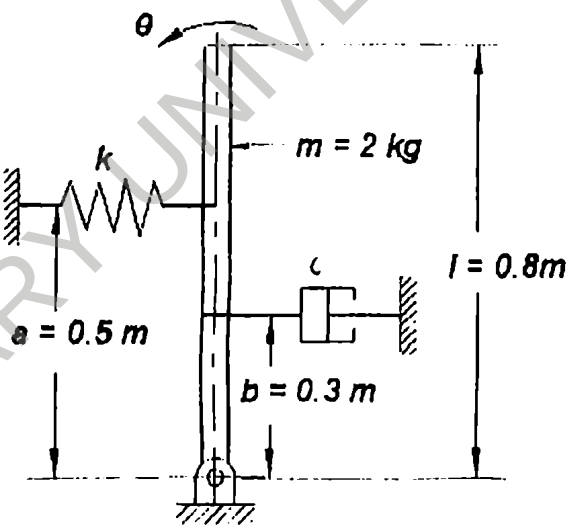
Draw a neat sketches showing an open and closed belt drive and label the parts.

Or

(b) A shaft is attached with four masses A, B, C and D of magnitudes W N, 300 N, 500 N and 400 N at radii of 18, 24, 12, 15 cms. The planes containing masses B and C are 30 cm apart. The angle between B and C is 90° and C is vertical. B and C make 210° and 120° respectively with D when measured in the same sense. For perfect balance of the shaft find :—

a) Weight and angular position of mass A.
b) Positions of planes A and D.

14. (a) Discuss the different types of free vibrations. Determine the damped natural frequency of the viscous damped system shown in figure, undergoing free vibrations. Assume, K = 5 kN/m, c = 15 kN-s/m.



Or

(b) The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after five oscillations. Determine : (i) Stiffness of the spring ; (ii) Logarithmic decrement ; and (iii) Damping factor.

(4 × 15 = 60 marks)

D 92203 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology Engineering

PT 14 504—MARKETING MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Discuss the influence of personal factors on consumer's buying behaviour.
2. Write notes on product concept.
3. Explain global and non-profit markets.
4. Discuss the scope and suppliers of market research.
5. Explain various tools used for data collection in market research.
6. What are the advantages of direct marketing ?
7. Write notes on market follower strategies.
8. Discuss different buying styles.
9. Discuss when and how to use relationship management.
10. Explain the development of integrated direct marketing.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Discuss societal marketing concept. (5 marks)
    (b) Discuss PIMS and BCG approaches to business planning. (10 marks)

Or

12. (a) Discuss the adoption of marketing management in non-profit sector. (5 marks)
    (b) Discuss 4 activities of corporate strategic planning. (10 marks)
13. Discuss the 5 steps involved in marketing research process.

Or

14. (a) Discuss different variables used in product differentiation. (10 marks)
    (b) Write notes on designing the competitive intelligent system. (5 marks)

Turn over

15. (a) Discuss various methods of estimating current market demand. (7 marks)

(b) What are the factors contributing new product development ? Discuss. (8 marks)

Or

16. Explain different stages of new product development process.

17. Discuss how can the companies use integrated direct marketing for competitive advantage.

Or

18. Discuss the channels direct marketers use to reach individual prospects and customers.

[4 × 15 = 60 marks]

D 92202 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Printing Technology Engineering

PT 14 503—OFFSET MACHINERY—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. List and brief on five functions of an offset inking system.
2. Explain in detail about principle of working of a packing gauge and bench micrometer.
3. Compare contact and non-contact dampening systems.
4. Explain the brush dampening system with diagram.
5. Explain the chopper fold mechanism.
6. What are the different types of dryers used on web offset presses ? Explain.
7. Explain the working of fountain solution mixer and recirculation system.
8. Write a short note on web offset press room safety and precautions to be taken.
9. How does the paper web behave when it passes through no. of printing units ? Explain.
10. Describe the flap dampening system with a neat diagram.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. What are perfecting and non-perfecting presses ? Explain with diagrams.

Or

12. With a neat diagram, explain the CIC web offset press. What are the types of CIC tower presses ? Explain.

(10 + 5 = 15 marks)

13. With neat diagrams, explain the inker feed, delhgreen and plate feed dampening systems.

Or

14. With neat diagrams, explain combination continuous flow dampening systems. Describe critical metering nip, slip nip and reverse slip nip.

Turn over

15. Describe the dancer roll tension control systems used on web presses with a diagram. Explain its construction and working principle.

Or

16. Explain with neat diagram the working of combination folder.

17. Describe a control console of web offset press. Explain the components and automated mechanisms handled through remote control console.

Or

18. Explain pattern gluing, segmented gluing, back bone gluing, perforating and numbering operations carried out on web after printing.

(4 × 15 = 60 marks)

D 92201 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Printing Technology Engineering

PT 14 502—ANALOG AND DIGITAL ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain how FET can be used as a switch.
2. With reference to a differential amplifier, define the following terms :

   (i) Differential gain A_d ; (b) Common mode gain A_{cm}.
3. With the help of a sketch, show how Op-Amp can be used as a differentiator.
4. Draw the block diagram of OP-AMP 741. For a practical OP-AMP give the values of following parameter (a) Bandwidth ; (b) PSRR.
5. Show that the dual of the exclusive-OR is equal to its complement.
6. Why digital circuits are more frequently constructed with NAND or NOR gates than with AND and OR gates ?
7. Give the Boolean expressions used for following gates :

   (a) AND ; (b) NOR ; (c) EX-OR ; (d) OR ; (e) NOT.
8. Design Mod-6 asynchronous counter using JK flip-flop.
9. Write short notes on parallel in serial out shift register.
10. Draw and explain the working of universal shift register.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Draw and explain construction of FET with its characteristics. (7 marks)

    (b) List the comparison between CB, CE and CC amplifiers. (8 marks)

Or

12. With the help of neat diagram, explain the operation of an *n*-channel enhancement type MOSFET.

Turn over

13. (a) Explain the working of an OP-AMP as non-inverting amplifier and derive an expression for the output.

(8 marks)

(b) With the help of sketch, show how an OP-AMP can be used as a differentiator.

(7 marks)

Or

14. Draw the inverting and non-inverting amplifier circuits of an Op-AMP in closed-loop configuration. Obtain the expressions for the closed-loop gain in these circuits.

15. Draw the circuit for half adder with the help of truth table. Explain its working. Also show how a full adder can be designed using two half-adders.

Or

16. (a) Show how a NOR gate can be used to realize NAND gate and NOT gate. (7 marks)

(b) State and prove De Morgan's theorem and illustrate them using an example for each.

(8 marks)

17. Draw and explain clocked SR flip-flop. Also draw its timing diagram.

Or

18. (a) Explain the working of SR flip-flop using NAND gates. (7 marks)

(b) Draw the circuit of RS flip-flop. Explain its working with the help of truth table.

(8 marks)

[4 × 15 = 60 marks]

D 92199 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2020

Biotechnology Engineering

BT 14 504—THERMODYNAMICS AND HEAT TRANSFER

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions. Each question carries 5 marks :

1 It is well known that warm air in a cooler environment rises. Now consider a warm mixture of air and gasoline on top of an open gasoline can. Do you think this gas mixture will rise in a coller environment ?

2 In 1775, Dr. William Cullen made ice in Scotland by evacuating the air in a water tank. Explain how that device works, and discuss how the process can be made more efficient.

3 Three kilograms of water in a container have a pressure of 100 kPa and temperature of 150° C. What is the volume of this container ?

4 Define thermal conductivity and explain its significance in heat transfer.

5 Define emissivity and absorptivity. What is Kirchhoff's law of radiation ?

6 A heat flux meter attached to the inner surface of a 3 cm. thick refrigerator door indicates a heat flux of 25 W/m.^{2} through the door. Also, the temperature of the inner and the outer surfaces of the door are measured to be 7° C. and 15° C., respectively. Determine the average thermal conductivity of the refrigerator door.

7 What is forced convection ? How does it differ from natural convection ? Is convection caused by winds forced or natural convection ?

8 What is thermal radiation ? How does it differ from the other forms of electromagnetic radiation ?

9 Write short notes on fouling factor.

10 What is the heat capacity rate ? What can you say about the temperature changes of the hot and cold fluids in a heat exchanger if both fluids have the same capacity rate ? What does a heat capacity of infinity for a fluid in a heat exchanger mean ?

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 A commercial refrigerator with refrigerant 134a as the working fluid is used to keep the refrigerated space at 235° C. by rejecting waste heat to cooling water that enters the condenser at 18° C. at a rate of 0.25 kg/s. and leaves at 26° C. The refrigerant enters the condenser at 1.2 MPa and 50° C. and leaves at the same pressure subcooled by 5° C. if the compressor consumes 3.3 kW of power, determine (a) the mass flow rate of the refrigerant ; (b) the refrigeration load ; (c) the COP.

Or

12 A piston-cylinder device contains 0.005 m^3 of liquid water and 0.9 m^3 of water vapour in equilibrium at 600 kPa. Heat is transferred at constant pressure until the temperature reaches 200° C. (a) What is the initial temperature of the water ? (b) Determine the total mass of the water ; and (b) Calculate the final volume.

13 Consider steady heat transfer between two large parallel plates at constant temperatures of T_1 = 290 K and T_2 = 150 K that are L = 2 cm. apart. Assuming the surfaces to be back (emissivity ε = 1), determine the rate of heat transfer between the plates per unit surface area assuming the gap between the plates is (a) filled with atmospheric air ; (b) evacated ; (c) filled with fiber glass insulation.

Or

14 Consider a flat-plate solar collector placed on the roof of a house. The temperatures at the inner and outer surfaces of the glass cover are measured to be 28° C. and 25° C. respectively. The glass cover has a surface area of 2.5 m^2, a thickness of 0.6 cm., and a thermal conductivity of 0.7 W/m°C. Heat is lost from the outer surface of the cover by convection and radiation with a convection heat transfer coefficient of 10 W/m^2°C. and an ambient temperature of 15° C. Determine the fraction of heat lost from the glass cover by radiation.

15 During a cold winter day, wind at 55 km./h. is blowing parallel to a 4 m. high and 10 m. long wall of a house. If the air outside is at 5° C. and the surface temperature of the wall is 12° C., determine the rate of heat loss from that wall by convection. What would your answer be if the wind velocity was doubled ?

Or

16 A 3 mm. thick glass window transmits 90 percent of the radiation between λ = 0.3 and 3.0 μm and is essentially opaque for radiation at other wavelengths. Determine the rate of radiation transmitted through a 2 m. × 2 m. glass window from blackbody sources at (a) 5800 K and (b) 1000 K.

17 A double-pipe heat exchanger is constructed of a copper (k = 380 W/m°C.) inner tube of internal diameter D_i = 1.2 cm. and external diameter D_o = 1.6 cm. and an outertube of diameter 3.0 cm. The convection heat transfer coefficient is reported to be h_i = 700 W/m.^{2}°C. on the inner surface of the tube and h_o = 1400 W/m.^{2}°C. on its outer surface. For a fouling factor R_{fi} = 0.0005 m.^{2}°C/W on the tube side and R_{fo} = 0.0002 m.^{2}°C./W on the shell side, determine (a) the thermal resistance of the heat exchanger per unit length and (b) the overall heat transfer coefficients U_i and U_o based on the inner and outer surface areas of the tube, respectively.

Or

18 A long thin-walled double-pipe heat exchanger with tube and shell diameters of 1.0 cm. and 2.5 cm., respectively, is used to condense refrigerant 134a by water at 20° C. The refrigerant flows through the tube, with a convection heat transfer coefficient of hi_5000 W/m.^{2}°C. Water flows through the shell at a rate of 0.3 kg/s. Determine the overall heat transfer coefficient of this heat exchanger.

(4 × 15 = 60 marks)

D 92197 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Biotechnology Engineering

BT 14 501—MASS TRANSFER OPERATIONS

Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the boundary layer theory.
2. Write short notes on Tray Tower.
3. Briefly explain the classification of Mass Transfer Operations.
4. Explain the Raoult's law.
5. What is relative volatility ? Explain.
6. Brief the basic concepts of distillation.
7. Write a note on the choice of solvent for liquid-liquid extraction.
8. Briefly explain the equipment's used in teaching.
9. What is freeze drying ? Explain with an example.
10. Explain the principles of crystallization.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. A thin film 0.4 cm. thick of an ethanol-water solution is in contact at 20°C at one surface with an organic liquid in which water is insoluble. The concentration of ethanol at the interface is 6.8 wt % and at the other side of film 10.8 wt %. The densities are 988.1 kg./m^3 and 972.8 kg./m^3 respectively for 6.8 wt % and 10.8 wt % ethanol solutions. Diffusivity of ethanol is 7.4 m^2/s. Calculate the steady state flux in k-mol/m^2s.

Or

Turn over

12. Write a note on packed tower, bubble column and spray tower.

13. A mixture of 40 % A and 60 % B is to be separated by distillation using a reflux ratio 3.5 so as to form an overhead product containing 95 mol % of A and a bottom product containing 95 mol % of B. The feed is saturated vapour. The relative volatility of A to B is 2.5. Determine the following :

    (a) Minimum reflux ratio.

    (b) Number of theoretical plates.

    (c) Minimum number of theoretical plates.

Or

14. A mixture of A and B is to be distilled the feed composition is 0.5 mol fraction of A. The concentration of A in the distillate is 90 % and 95 % of B is there in the residue. The feed is half vapour and average relative volatility of the mixture is 2.5. Determine the minimum reflux ratio, the number of ideal stages if optimum reflux ratio is twice the minimum value and the minimum number of theoretical plates for this separation.

15. What is liquid-liquid extraction ? Give few examples. Also explain its applications in detail.

Or

16. What is leaching ? Explain single and multistage leaching with applications.

17. Name the classification of drying equipment. Explain any two drying equipments in detail.

Or

18. What is crystal growth ? Also explain the effect of impurities on crystal formation in detail.

(4 × 15 = 60 marks)

D 92196 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Instrumentation and Control Engineering

IC 14 505—INDUSTRIAL INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 What are the primary standards for temperature measuring calibration ?

2 Illustrate the working principle of bimetallic thermometer.

3 Summarize the application of thermograph and thermostat.

4 State the principle of McLeod gauge.

5 Identify the equipment require to install a pressure gauge in a pipeline.

6 Classify the pressure based on the type of measurement.

7 What are the advantages of float type level measurement ?

8 Summarize two commonly used electrical method for measuring liquid level in industries.

9 State the need for pH measurement.

10 Discuss viscosity index.

(8 × 5 = 40 marks)

Part B

Answer any **four** *questions.*
Each question carries 15 *marks.*

II. 1 Discuss the various types of filled in system thermometers. What are the possible sources of errors in filled in thermometrs and how are they compensated ?

Or

2 Explain about the construction and working of different types of radiation pyrometer with neat sketch.

3 Describe the methods of measurment of pressure using thermal conductivity gauges and ionization gauge.

Or

Turn over

4 Demonstrate how a dead weight tester is used to calibrate pressure measuring device and mention the factors affecting the accuracy of Dead weight tester.

5 (i) Explain the principle of operation of displacer type level measuring scheme with neat sketch.

(ii) With neat diagram, explain the capacitance type of level measurement.

Or

6 Illustrate how gauge glass techniques coupled with photoelectric read out system can be used for level measurement.

7 Explain digital pH meters in detail.

Or

8 Illustrate with neat sketch about Saybolt Viscometer.

(4 × 15 = 60 marks)

D 92191 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Biomedical Engineering

BM 14 503—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*
Each question carries 5 *marks.*

1. State any *five* properties of DFT.
2. Find the DFT of the sequence $x(n) = \{2, 3, 4, 5\}$ using radix - 2 DIF - FFT algorithm.
3. Write short notes on Applications of FFT.
4. Compare digital filters versus analog filters.
5. Describe about FIR filters in brief.
6. Distinguish between Butterworth and Chebyshev filter.
7. Write short notes on signal flow graphs.
8. What is frequency sampling ? Explain.
9. Explain the working of multiplier in Harvard Architecture.
10. Explain about pipelining.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Find the convolution of the two signals $x(n) = u(n)$ and $h(n) = a^n u(n)$, ROC : $|a| < 1 ; n \geq 0$.

Or

12. Using linear convolution find $y(n) = x(n) * h(n)$ for the sequences

$x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 1, 2, -1\}$ and $h(n) = \{1, 2\}$. Compare the result by solving the problem using overlap add method and overlap save method.

13. Explain analog frequency transformation and write the transformation formulae for LPF, HPF, BPF and band stop filter.

Or

14. Explain the design of IIR filters from analog filters.

15. Discuss the following :

(a) Product quantization error. (8 marks)

(b) Limit cycle oscillations. (7 marks)

Or

16. Illustrate the effect on quantization of filter co-efficients for the following problem :

$H(z) = 1/\left(1 - 0.9z^{-1} + 0.2z^{-2}\right)$. Take word length of 4 bits.

17. Write a detailed note on special purpose DSP hardware.

Or

18. Outline the architecture of TMS 320 series processor with neat diagram.

[4 × 15 = 60 marks]

D 92183 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Aeronautical Engineering

AN 14 506—AIRCRAFT SYSTEMS, INSTRUMENTATION AND APPLICATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 What is meant by fly-by-wire FCS ?

2 With a neat sketch, explain the components of an autopilot.

3 List out the properties of hydraulic fluids.

4 Explain the working principle of independent brake system.

5 Differentiate wet sump and dry sump lubrication systems.

6 What are the main components of fuel system ?

7 Discuss about battery ignition system.

8 Write the working principle of pneumatic deicing system.

9 Explain the properties of gyroscopes.

10 Draw and explain the operation of a mechanical tachometer.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

II. 1 (a) Explain different types of engine control sytems used in aircrafts. (10 marks)

(b) What are the components of an autopilot ? Explain. (5 marks)

Or

2 Explain the components and working of Instrument Landing System.

3 What are the components of a typical penumatic system ? Explain with a neat diagram.

Or

4 (a) Differentiate air-oleo strut and spring-oleo-strut. (5 marks)

(b) With a neat diagram, explain the landing gear retraction system in large aircraft. (10 marks)

Turn over

5 Draw and explain the lubrication systems used in piston and Jet engines.

Or

6 List and explain various starting systems used for a gas turbine engine.

7 Draw and explain the types of oxygen systems used in aircrafts.

Or

8 Write short notes on the following :

(a) Airspeed indicator.

(b) Altimeter.

(c) EPR gauge.

(4 × 15 = 60 marks)

D 92178 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 506—METROLOGY AND INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions. Each question carries 5 marks :

1 What are the needs for measurement ?

2 Write short notes on drunken error, how it can be avoided.

3 List down how a strain gauge can be used in a measurement.

4 Differentiate between Primary and Secondary transducers.

5 With neat sketch, explain about flow measurement using rotameters.

6 Write short notes on resistance thermometers.

7 What are the advantages of using laser beam interferometry ?

8 What is meant by best wire size in screw thread meaurement ?

9 Define sensitivity of a measuring device.

10 What is the need for torque measurement ? List down few instruments used for torque measurement.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 Explain the various methods of measurement.

Or

12 (a) Explain in detail about different type of errors in measurement and their causes. (9 marks)

(b) Explain how the performance of a measuring device is rated. (6 marks)

13 With neat sketches, explain different type of transducers.

Or

14 What is strain gauge ? Briefly explain the working of different types of strain gauge. Define load cells and mention its types.

Turn over

D 92178 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 506—METROLOGY AND INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions. Each question carries 5 marks :

1 What are the needs for measurement ?

2 Write short notes on drunken error, how it can be avoided.

3 List down how a strain gauge can be used in a measurement.

4 Differentiate between Primary and Secondary transducers.

5 With neat sketch, explain about flow measurement using rotameters.

6 Write short notes on resistance thermometers.

7 What are the advantages of using laser beam interferometry ?

8 What is meant by best wire size in screw thread meaurement ?

9 Define sensitivity of a measuring device.

10 What is the need for torque measurement ? List down few instruments used for torque measurement.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 Explain the various methods of measurement.

Or

12 (a) Explain in detail about different type of errors in measurement and their causes. (9 marks)

(b) Explain how the performance of a measuring device is rated. (6 marks)

13 With neat sketches, explain different type of transducers.

Or

14 What is strain gauge ? Briefly explain the working of different types of strain gauge. Define load cells and mention its types.

Turn over

15 With neat sketches, explain about different thermometers used for temperature measurement.

Or

16 With neat sketches, explain about different types of pyrometers used in Industry.

17 Explain the term slip gauges. Also explain the construction and working of sine bar with the help of neat diagram. Mention its advantages and disadvantages.

Or

18 Explain the working of Parkinson's gear testing machine with the help of neat sketch.

(4 × 15 = 60 marks)

D 92177 (Pages : 3) Name.....

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FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 505—MECHANICS OF MACHINERY

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten. Each question carries 5 marks :

1 Define kinematic pair. How are pairs classified ? Give examples.

2 A rigid link AB is rotating anticlockwise about point A with angular velocity 'ω' and angular acceleration 'α'. Describe the method of drawing the acceleration diagram.

3 Define mechanical advantage and transmission angle of a mechanism.

4 How are the cams classified ? Describe in detail.

5 Compare the performance of knife-edge, roller and mushroom followers.

6 Explain the procedure to lay out the cam profile for a reciprocating follower.

7 What is a gear train ? What are its main types ?

8 With a neat sketch, define the terms related to helical gears : helix angle, circular pitch, normal circular pitch.

9 Describe the classifications of synthesis problem.

10 What is least-square technique ? When is it useful in designing a four-link mechanism ?

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 (a) Illustrate and explain any *one* quick return mechanism. (7 marks)

(b) Discuss the method to construct acceleration diagram of a slider crank mechanism.

(8 marks)

Or

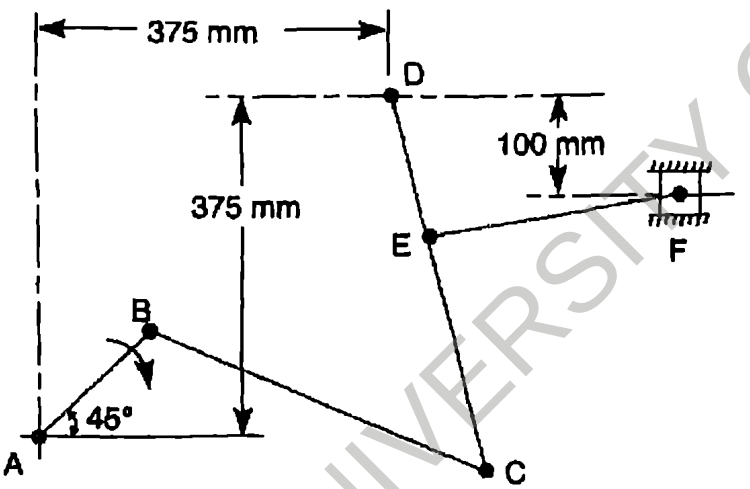
Turn over

12 The mechanism, as shown in Figure, has the dimensions of various links as follows : AB = DE = 150 mm ; BC = CD = 450 mm ; EF = 375 mm. The crank AB makes an angle of 45° with the horizontal and rotates about A in the clockwise direction at a uniform speed of 120 r.p.m. The lever DC oscillates about the fixed-point D, which is connected to AB by the coupler BC. The block F moves in the horizontal guides, being driven by the link EF. Determine :

(i) Velocity of the block F ;

(ii) Angular velocity of DC ; and

(iii) Rubbing speed at the pin C which is 50 mm in diameter.



13 (a) Draw and briefly explain the displacement, velocity and acceleration diagrams for a follower when it moves with cycloidal motion. (6 marks)

(b) With illustrations, discuss the steps for construction of cam profile for a radial cam with roller follower moving with uniform velocity and the axis of follower is offset by 'x' mm from the axis of the cam shaft. (9 marks)

Or

14 A cam is to be designed for a knife edge follower with the following data : Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion; Dwell for the next 30° ; During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion ; Dwell during the remaining 180°.

Draw the profile of the cam when :

(i) The line of stroke of the follower passes through the axis of the cam shaft ; and

(ii) The line of stroke is offset 20 mm from the axis of the cam shaft.

The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

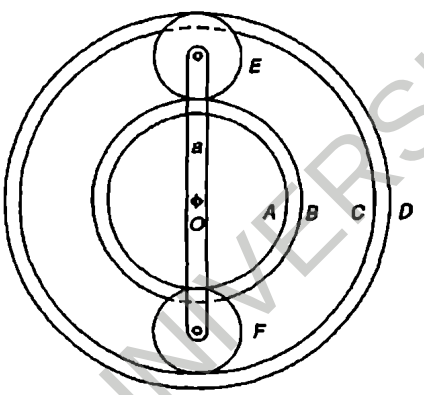
15 State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing.

Or

16 In the epicyclic gear train shown in Figure, the compound wheels A and B as well as internal wheels C and D rotate independently about the axis 0. The wheels E and F rotate on the pins fixed to the arm *a*. All the wheels are of the same module. The number of teeth on the wheels are TA = 52, TB = 56,TE = TF = 36. Determine the speed of C if :

(i) The wheel D fixed and arm *a* rotates at 200 r.p.m. clockwise.

(ii) The wheel D rotates at 200 r.p.m. counter-clockwise and the arm *a* rotates at 20 r.p.m. counter-clockwise.



17 (a) Describe the procedure to design a four-link mechanism by relative pole method when three positions of the input $(\theta_1, \theta_2, \theta_3)$ and the output link $(\varphi_1, \varphi_2, \varphi_3)$ are known.

(8 marks)

(b) Describe the procedure to design slider crank mechanism by inversion method. (7 marks)

Or

18 Synthesize a four-bar mechanism to generate a function $y = \sin x$ for $0 \leq x \leq 90°$. The range of the output crank may be chosen as 60° while that of input crank be 120°. Assume three precision points which are to be obtained from Chebyshev spacing. Assume fixed link to be 52.5 mm long and $\theta_1 = 105°$ and $j_1 = 66°$.

[4 × 15 = 60 marks]

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FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 504—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions. Each question carries 5 marks :

1 Illustrate the open circuit characteristics of DC generator.

2 List down the applications of DC motors.

3 What are the possible causes of excessive sparking at brushes in a DC motor ?

4 What effects are produced in a transformer by change in voltage ?

5 Explain transformer no load condition with phasor diagram.

6 What is voltage regulation in a transformer ?

7 What is the effect of change in frequency on speed on an induction motor ?

8 What is chording factor in alternator ?

9 Compare SCR, TRIAC and MOSFET.

10 Illustrate the working of an AC-DC rectifier.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 Explain the working of DC motor with neat sketch.

Or

12 Explain the start stop system of generators.

13 Explain the construction and working of a single-phase transformer.

Or

14 What are indicating instruments ? Explain the principle of one of the indicating instrument.

15 With neat diagram, explain the working of an alternator.

Or

16 Explain the torque slip characteristics of a 3-phase induction motor.

17 Explain three-phase induction motor drives.

Or

18 Explain the control characteristics of SCR.

(4 × 15 = 60 marks)

D 92175 **(Pages : 2)** **Name.....**

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 14 503—VEHICLE DESIGN ENGINEERING—I

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions. Each question carries 5 marks :

1 Explain the term fit and significance of the same.

2 What is meant by Cam Profile and explain the use of cam profile.

3 Write a short note on effect of lack of lubrication in piston.

4 Explain the procedure of piston pin design.

5 Write short notes on piston slap and piston seizure.

6 Explain the properties needed for the material used for manufacturing connecting rod.

7 What is meant by short and long crank arms ?

8 Explain various stresses acting on flywheel rim.

9 What is meant by turning moment diagram ? Explain its need.

10 Explain various stresses acting on flywheel.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 Design a valve spring with spring index 8, stiffness of spring 10 N/mm, permissible torsional shear stress on the spring wire is 300 N/mm.^{2}, Modulus of ridigity of spring wire is 84 × 10^3 N/mm.^{2} and total gap between the consecutive coils when the spring is compressed by maximum force is 15 % of maximum compression.

Or

12 Explain the design procedure for a push rod with proper equations.

13 Explain the design procedure for connecting rod with necessary equations.

Or

14 Note down the design procedure for crank shaft under bending and twisting.

Turn over

15 Explain the procedure for determining the minimum length of connecting rod.

Or

16 (a) What is meant by firing order ?

(b) Explain the significance of firing order and mention possible firing order for four and six cylinder engines.

17 Explain the procedure for determination of mass of flywheel for a given coefficient of fluctuation of speed.

Or

18 Describe the procedure for design of hubs and arms of a flywheel.

(4 × 15 = 60 marks)

D 92174 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 506—COMPUTATIONAL METHODS IN ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Find the real root of $x \log_{10} x = 2$ correct to four decimal places using false position method.
2. Use Newton Raphson method to solve the equation $3x - \cos x - 1 = 0$.
3. What is pivoting in Gauss elimination method ? What is the advantage of pivoting ?
4. What is Thomas algorithm ? Where the method is used for ?
5. State Newton's forward interpolation formula.
6. Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ by two point and three point Gaussian formula and compare with exact value.
7. Find $f(301)$ using divided difference interpolation method from the following data :

x	:	300	304	305	307
$f(x)$	:	2.4771	2.4829	2.4843	2.4871

8. What is Euler's formula and modified Euler's formula.
9. Employ the classical fourth order Runge-Kutta method to integrate $y' = 4e^{0.8t} - 0.5y$ from $t = 0$ to $t = 1$. Using stepsize of 1 with $y(0) = 2$.
10. State advantage and disadvantages of Tylor's series.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Using Muller method solve the roots of equation $f(x) = 2x^3 - 2x - 5$.

Or

12. Find the root of $x^3 - 4x^2 + 5x - 2 = 0$. Using Graeffe's root squaring method.

Turn over

13. Using Gauss Jordan method find the inverse of matrix $\begin{bmatrix} 1 & 2 & 6 \\ 2 & 5 & 15 \\ 6 & 15 & 46 \end{bmatrix}$.

Or

14. Determine largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ with $[0 \quad 0 \quad 1]^T$ as initial vector by power method.

15. Find $f(28)$ from the following data using Stirling Interpolation method :

x :	20	25	30	35	40
$f(x)$:	49225	48316	47236	45926	44306

Or

16. The velocity V of a car starts from rest is given by the table :

t(min) :	0	2	4	6	8	10	12
V(km/min) :	0	10	18	25	29	32	20

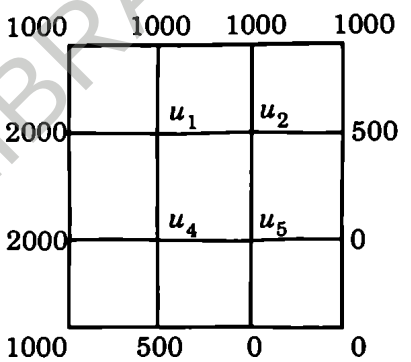
Estimate approximate distance covered in 12 minutes by Simpson's 1/3rd rule calculate acceleration at 2 seconds.

17. Find $y(2)$ by Adams hashforth predictor method from $y' = \frac{x+y}{2}$ and data :

x_i :	0	0.5	1	1.5
y_i :	2	2.636	3.595	4.968

Or

18. Evaluate function $u(x, y)$ satisfing Laplace equation $\nabla^2 u = 0$ at pivotal points of figure by Gauss seidal method. Values of $u(x, y)$ on boundary of square are given below :



(4 × 15 = 60 marks)

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Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 505—INTERNAL COMBUSTION ENGINES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Compare four stroke and two stroke cycle engines.
2. Discuss the difference between Theoretical and Actual valve timing diagram of petrol engine.
3. Explain various scavenging process used in two stroke engines.
4. Define viscosity index of an oil. What are the desirable properties of lubricants ?
5. Differentiate between Supercharging and Turbo charging.
6. What you mean by MPFI and CRDI ?
7. List various methods available for finding frictional power.
8. Give various alternate fuels for IC engine.
9. What are the requirements of a good combustion chamber ?
10. Explain the terms controlled, uncontrolled and abnormal combustion.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Derive an expression for the air standard efficiency of Otto cycle. (10 marks)

    (b) What are the differences between Air standard cycle and Fuel air cycle. (5 marks)

Or

12. (a) In an engine working on diesel cycle, the inlet pressure is 1 bar. The pressure at the end of isentropic compression is 35 bar. The ratio of expansion is 6. Calculate the air standard efficiency and mean effective pressure. (10 marks)

    (b) With the help of a diagram, explain a Stirling cycle. (5 marks)

Turn over

13. (a) Explain the construction and operation of a simple carburetor with the help of a digram. (10 marks)

(b) What are the basic properties of lubricants used in IC engines. (5 marks)

Or

14. (a) Describe with a neat sketch thermostat cooling method of cooling IC engines. (10 marks)

(b) What are the advantages and disadvantages of stratified engine. (5 marks)

15. (a) An eight cylinder four stroke SI engine of 80 mm. bore and 100 mm. stroke is tested at 4000 r.p.m. on a dynamometer which has 60 mm. arm. The dynamometer scale reading was 40 kg. The time for 100 cc of fuel consumption is recorded as 9 seconds. The calorific value of fuel is 44000 kJ/kg. Air at 1 bar and 27°C. was supplied at the rate of kg/minute. Assume specific gravity of fuel to be 0.7. Clearance volume of each cylinder is 65 cc. Determine brake power, brake mean effective pressure, air/fuel ratio and brake thermal efficiency. (10 marks)

(b) Describe the principle of retardation test. (5 marks)

Or

16. (a) Distinguish between Octane number and Cetane number. What is their significance in rating of fuel for SI and CI engines ? (10 marks)

(b) State the advantages and disadvantages of hydrogen as IC engine fuel. (5 marks)

17. (a) Explain various stages of combustion in SI engine with the help of pressure-crank angle diagram. (10 marks)

(b) What are the methods of detecting knock in SI engines. (5 marks)

Or

18. (a) Explain clearly the factors which tend to prevent knocking in CI engines. (10 marks)

(b) What are the major pollutants from exhaust of gasoline and diesel engine. (5 marks)

[4 × 15 = 60 marks]

D 92172 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 504—MECHANICS OF MACHINERY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

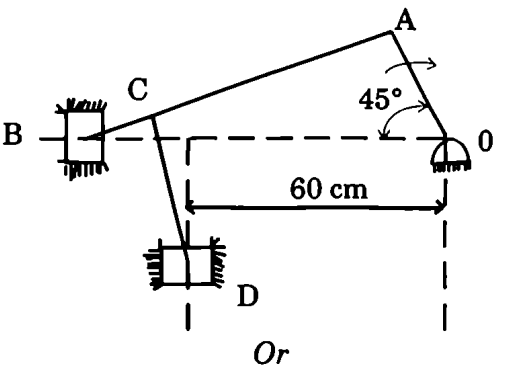
1. What are different types of kinematic pair ?
2. What are the difference between Mechanism and Machine with examples ?
3. What is coriolis component of acceleration where it is applicable ?
4. Write down the classification of follower based on the surface in contact.
5. Explain the terms of a radial cams :
   (i) Pitch curve ; (ii) Pressure angle ; (iii) Prime circle.
6. Explain the term interference of gears.
7. Explain the working of differential gear train used in automobile.
8. Explain the terms :
   (a) Number synthesis ; (b) Dimensional synthesis.
9. What is function generator ?
10. What is coupler curves ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. The length of various links of mechanism as shown in figure are OA = 30 cm., AB = 100 cm., CD = 80 cm. and AC = CB. Determine for given configuration velocity of slider B and D, if the crank OA rotates at 60 RPM in clockwise direction find angular velocity of link CD.



Or

12. Write down any two approximate and one exact straight line mechanism with neat sketch.

13. A plate cam with reciprocating roller follower has the following specification :

    (i) Angular speed of cam—1000 r.p.m.

    (ii) Cam contour set for SHM.

    (iii) Stroke of follower—25 mm.

    (iv) Angle of action outstroke = 120°.

    (v) Angle of action for return stroke = 100°.

    Determine displacement, velocity and acceleration of the roller follower at cam angle of 30°.

Or

14. Draw the profile of a cam which will give lift of 37.5 mm. to a roller follower. The diameter of roller is 25 mm. and the line of stroke is offset by 20 mm. from the axis of cam. The outstroke of the follower take place with SHM during 72° of cam rotation, followed by a period of rest during 18° of cam rotation. The follower then returns with equal uniform acceleration and retardation during 54° of cam rotation. The minimum radius of cam is 50 mm. If the cam rotates at a uniform speed of 240 r.p.m. find the maximum acceleration during outstroke and return stroke.

15. Number of teeth on each of two equal spur gears in mesh is 40. The teeth have 20° involute profile and module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum.

Or

16. An epicyclic gear train consists of an internal gear A, a pinion B and a wheel C. The wheel C concentric with A. The pinion B is carried on arm and gears with A and C. The arm is free to revolve about the axis of C and makes 20 r.p.m. clockwise. If the no. of teeth of A and C are 96 and 48 respectively, determine speed of B and C when gear A is fixed.

17. (a) Determine Chebyshev spacing for function $y = 2x^2 - x$ for range $0 \leq x \leq 2$ where four precision points required.

    (b) For these precision points, determine ϕ_2, ϕ_3, ϕ_4 and ψ_2, ψ_3, ψ_4 if $\Delta\phi = 45°$ and $\Delta\psi = 90°$.

Or

18. Design four bar mechanism which will satisfy the following precision condition

    $w_2 = 8$ rad/sec $\quad \alpha_2 = 0$

    $w_3 = 1$ rad/sec $\quad \alpha_3 = 20$ rad/s^2

    $w_4 = 6$ rad/sec $\quad \alpha_4 = 0$

    length of fixed link = 100 mm.

(4 × 15 = 60 marks)

D 92171 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 503—HEAT AND MASS TRANSFER

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. What is conduction shape factor ?
2. When transient conduction can be analysed as lumped heat capacity system ?
3. Define critical thickness of insulation of sphere.
4. Define the non-dimensional numbers used in convection. What are the significance of these numbers ?
5. What is the difference between Pool boiling and Film boiling ?
6. Explain the spectrum of thermal radiation.
7. Explain the need of NTU method for the performance evaluation of heat exchanger.
8. Why fouling and scaling is important while analysing the performance of heat exchanger ?
9. What are the characteristics of radiation shape factor ?
10. What is Lewis Number ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Derive the general conduction equation in cylindrical co-ordinates system and hence derive the expression for cylinder with steady-state, one dimensional and no heat generation.

Or

12. A thick steel slab is initially at uniform temperature of 25° C. When the slab is exposed to hot flue gases, the surface temperature suddenly changes to 450° C. Calculate the temperature in the plane 250 mm. from the slab surface 5 hour after change in surface temperature. Also calculate the heat flow per $m.^2$ of this plane and total energy flowing the surface during the 5 hour period.

Turn over

13. A pipe carrying steam in a large room and exposed to air at temperature of 303° K. The pipe surface temperature is 473° K. The pipe diameter is 20 cm. if the total heat loss from the pipe per meter length is 1.9193 kW/m. Determine pipe surface emissivity and natural heat transfer coefficient.

Or

14. A tube 15 mm. outside diameter and 1.5 long is used for condensing steam at 40 KPa. Calculate the average heat transfer coefficient when the tube is (a) horizontal ; and (b) vertical with surface temperature is maintained at 50° C.

15. Calculate for a black body at 2650° C. :

    (i) Spectral emissive power at $\lambda = 1.2$ μm.

    (ii) Wavelength at which emissive power is maximum.

    (iii) Maximum spectral emissive power.

    (iv) Total emissive power.

    (v) Total emissive power of furnace if it is treated as diffuse body with an emissivity of 0.9.

Or

16. Calculate heat transfer rate per unit area by radiation between the surfaces of two long concentric cylinder having radii 5 cm. and 10 cm. respectively. The inner surface is maintained at 400 K and outer surface at 300 K. The emissivity for both surface is 0.5.

17. Derive an expression for LMTD of a parallel flow heat exchanger.

Or

18. Estimate the diffusion rate of water from the bottom of the test tube 1.5 cm. in diameter and 15 cm. long into dry atmospheric air at 25° C.

    Take $D = 25.6 \times 10^{-6}$ m.^{2}/s.

(4 × 15 = 60 marks)

D 92170 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME 14 502—METAL CUTTING AND FORMING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Discuss the mechanism of chip formation in machining ductile materials.
2. Explain the cutting conditions favourable for the formation of continuous and discontinuous chips.
3. What are the important characteristics of cutting tool materials ?
4. Illustrate the principle of thread cutting in lathe with a neat sketch.
5. Distinguish between glazing and loading of grinding wheels.
6. Distinguish between up milling and down milling.
7. Explain the working principle of water jet machining.
8. Discuss about the mechanism of material removal in USM.
9. Discuss the significance of clearance between punch and die in punching and blanking operation.
10. Distinguish between open die and impression die forging.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) What is tool signature ? Draw the multi-view of a single point cutting tool and analyze the effect of tool geometry on machining.

Or

(b) What are the different types of tool wear ? Also discuss about different tool wear mechanisms.

12. (a) With a neat sketch, explain how the idle time during return stroke is reduced in shaper.

Or

(b) Describe in detail the standard marking system of grinding wheel.

Turn over

13. (a) Explain the working principle of LBM. What are the different types of lasers used in LBM ?

Or

(b) With a neat sketch, explain the working principle of EDM. Discuss the effect of different parameters of EDM on MRR and surface finish.

14. (a) What are the advantages of HERF processes ? Explain the following forming processes (i) Explosive forming ; (ii) Electromagnetic forming.

Or

(b) With a schematic diagram, discuss about the different zones in a wire drawing operation and its significance. Also find the expression for calculating the drawing stress applied in wire drawing operation.

(4 × 15 = 60 marks)

D 92169 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Information Technology Engineering

IT 14 505—INTRODUCTION TO MICROPROCESSOR SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Differentiate between Microprocessors and Microcontrollers with suitable real time examples.
2. List the characteristics of Digital Signal Processors.
3. Differentiate between Procedures and Macros used in 8086 Assembly language programs.
4. Explain the following instructions with examples :
   (i) CMP. (ii) LOOP.
   (iii) TEST. (iv) IMUL.
5. What is stack ? What is the use of stack memory ? Explain the execution of push and pop instructions.
6. Differentiate between minimum and maximum modes in 8086 microprocessors.
7. What are the steps involved in interfacing peripherals with the 8086 microprocessor ?
8. Sketch and explain the 8086 bus activities during write machine cycle.
9. What are the main characteristics of RISC architectures ?
10. Explain the working of subroutines in ARM microprocessors with an example.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Explain the 8086 microprocessor architecture in detail with a neat sketch.

Or

(b) Explain the flags of 8086 processors using suitable examples.

12. (a) Write an ALP using 8086 instructions to count the numbers of zeros in a given 8-bit number.

Or

(b) Explain the various string manipulation instructions available in 8086 microprocessors with examples.

13. (a) Sketch and explain the interface mechanism of 8279 to the 8086 microprocessor in minimum mode.

Or

(b) Explain with a neat diagram the interfacing of stepper motor to 8086 using 8255 in detail.

14. (a) Explain the various addressing modes available in ARM processor.

Or

(b) Sketch the ARM7TDMI block diagram and explain the components involved in it.

(4 × 15 = 60 marks)

D 92168 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT 14 506—THEORY OF COMPUTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Construct the ε-NFA, NFA, DFA and minimized DFA for the regular expression $a + b * a$. Trace the action of the automation for the input string "*bbba*".
2. Let x & y be real numbers. If "$5x + 25y = 1723$, then x or y is not an integer." Prove by direct approach, contra positive and contradiction.
3. Differentiate between positive closure and kleena closure. Give examples.
4. Prove by induction, for $n \varepsilon$ N $4/(32n + 7)$.
5. Discuss the applications of finite automata.
6. Prove the equivalence of NFA and DFA using subset construction.
7. Explain Turing machines as a computer of integer functions with an example.
8. Prove that no Turing machine exists to solve the halting problem.
9. Explain about undecidability of PCP.
10. "Both a language L and its complement cannot be recursively enumerable." Prove.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Construct DFA to accept the language :

    L = {w | w is of even length and begins with 11}.

Or

12. Construct DFA from two languages L1 and L2 given by the regular expressions (0 + 1)* 0 and 1 (0 + 1)*. Find DFA and regular expressions for L1 ∩ L2, complement L2 and reversal of L2.

Turn over

13. Given the following grammar G

$S \rightarrow AABB.$

$A \rightarrow AA \mid a.$

$B \rightarrow BB \mid b.$

(i) Remove all left recursions from G.

(ii) Write G in Greibach normal form.

(iii) Construct a PDA that accepts the language generated by G from GNF.

(iv) Show the actions of the parser for a sample input.

Or

14. Explain Chomsky hierarchy of languages. Explain the automation accepting these languages with their formal definitions.

15. What is Universal Turing Machine ? Explain its working with encoding. Give illustrations.

Or

16. Describe a Turing Machine to reverse a given string in $\Sigma = \{a, b\}$. Test for an input string "*baba*"

17. State Post Corresondence problem. Prove that Post Correspondence problem is undecidable. Assuming $\Sigma = \{0, 1\}$ check whether the following Turing machine accepts string '10' and convert it into a MPCP instance.

Or

18. Does the following language satisfy conditions in Rice's theorem ? P = {<M> : M is a Turing machine and L(M) = {1011, 001100}. State and prove Rice's theorem.

(4 × 15 = 60 marks)

D 92167 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS 14 505—DIGITAL DATA COMMUNICATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Differentiate the working of synchronous and asynchronous mode of communication.
2. Explain any two types of guided media and any two types of unguided media transfer used in networks.
3. With a neat sketch, explain the working of mesh topology and star topology used in networks.
4. How is checksum method used for error detection ? Explain with an example.
5. Define constellation diagram and explain its role in analog transmission.
6. Distinguish between multiple-slot Time Division Multiplexing and Pulse-stuffed Time Division Multiplexing techniques.
7. Compare and contrast a circuit-switched network and a packet-switched network.
8. Describe the need for switching and define a switch.
9. Differentiate between flow-control and error-control mechanism.
10. Explain the working of stop-and-wait protocol.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Explain in detail about the OSI model highlighting the functionalities of each layer.

Or

(b) Write a note on the following :—

(i) Transmission impairment.

(ii) Definitions of bandwidth, throughput, latency and Jitter.

12. (a) Given the data word 1011001110 and the divisor 10011, explain how error detection and validation can be carried out using cyclic redundancy check code.

Or

(b) Explain the working of Hamming Codes with an example.

13. (a) Ten sources, seven with a bit rate of 250 kbps and three with a bit rate of 400 kbps are to be combined using multilevel TDM with no synchronizing bits. Answer the following :—

(i) What is the size of a frame in bits ?

(ii) What is the frame rate ?

(iii) What is the duration of a frame ?

(iv) What is the data rate ?

Or

(b) Explain in detail about the working of cable TV networks and the Cable TV for data transfer.

14. (a) Explain in detail about the working of HDLC protocol.

Or

(b) Explain the working of Point-to-Point protocol in detail.

(4 × 15 = 60 marks)

D 92166 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT 14 504—DATABASE MANAGEMENT SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Define Data Models and list the types of Data Model.
2. What is an Attribute ? Explain its types.
3. Explain the Codd's rules for relational database design.
4. Describe project and union operation of Relational Algebra with example.
5. Mention the pitfalls in relational database design. With a suitable example, explain the role of functional dependency in the process of normalization.
6. Prove that a relation which is in 4NF must be in BCNF.
7. Write a short note on two phase locking protocol. What are its advantages and disadvantages ?
8. What is deadlock ? Explain deadlock detection method.
9. Write about immediate update and deferred update recovery techniques.
10. Explain serializability in transaction management.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Explain the purpose of the database system. Explain different database users. What are the responsibilities of a DBA ?

Or

12. Explain E-R model in detail. Draw E-R diagram for university and hospital (Specify the assumptions).

Turn over

13. List various aggregate functions. Explain any one with example.

Or

14. Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. State any assumptions you make.

15. What is Functional dependency ? Explain its usage in database design. Explain various types of functional dependency.

Or

16. What do you mean by Normalization ? Explain BCNF, 3NF and 2NF with a suitable example.

17. Describe the ACID properties of transaction management.

Or

18. What is concurrency ? If not controlled where it can lead to ? What are the methods to control concurrency ?

(4 × 15 = 60 marks)

D 92165 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT 14 503—OPERATING SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Differentiate between Symmetric multiprocessing and Asymmetric multiprocessing with examples.
2. Compare the monolithic and microkernel structures in the operating system.
3. List any two open source operating systems along with its characteristics.
4. Write a note on thread libraries.
5. Explain the different states of a proces with a neat diagram.
6. What is meant by interprocess communication ? Mention its advantages.
7. Differentiate between Paging and Segmentation mechanism. Which one is preferred mostly and why ?
8. Write about the various file access techniques.
9. Write about the goals of protection and about the protection principles.
10. Define Cryptography. How is cryptography used as a security tool ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Explain in detail about the various operating system services.

Or

(b) Explain the various types of system calls in detail with appropriate examples.

12. (a) Write in detail about the various multi-threading models.

Or

(b) Explain the Shortest Job First scheduling algorithm and the Round-Robin CPU scheduling algorithm with appropriate examples.

Turn over

13. (a) Explain in detail about the various steps involved when a page fault occurs in memory management.

Or

(b) Explain the various directory structures in detail.

14. (a) Explain the various RAID structures in detail.

Or

(b) Explain the working of any three Disk scheduling algorithms in detail.

(4 × 15 = 60 marks)

D 92164 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT 14 502—SOFTWARE ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. How does a software product differ from other products ? Also specify the reasons for failure of software projects.
2. Describe the incremental model of software development with its pros and cons.
3. Draw a class diagram for library management system and specify the functional requirements.
4. Describe the golden rules in user interface design.
5. List and explain the steps in creating an architectural design.
6. What are the objectives of testing ? Also list the standards and guidelines for coding.
7. Explicate how test plan is generated and test results are reported.
8. Why do we need system testing ? Explain the types of system testing with example.
9. Write a note on the methods for software licensing.
10. Explain how staffing is managed in software process.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. State the advantage and limitations of waterfall model along with description of its phases in software development.

Or

12. Which process model is best suited for risk management ? Discuss in detail with example. Give the advantages and disadvantages of this process model.

13. Explain in detail the design concepts that are applied for an effective design.

Or

14. Draw the level 0, 1, 2 DFD for the safe home security system and convert it to structured chart using structured design.

15. What is black bod testing ? Explain the different types of black bod testing strategies with an example.

Or

16. For the following code, perform basis path testing and design test cases :

```
printf("Enter number of elements/n", n);
 scanf("%d", &n);
 printf("Enter %d integers/n", n);
 for (c = 0, c < n; c++)
  scanf("%d", &array[c]);
 for (c = 0 ; c < n - 1; c++)
 {
  for (d = 0 ; d < n - c - 1; d++)
  {
    swap = array[d];
    array[d] = array[d+1];
    array[d+1] = swap;
  }
 }
}
printf("sorted list in ascending order:/n")
for (c = 0; c < n, c++)
   printf("%d/n", array[c]);
 return 0;
```

17. Explain with an example the COCOMO cost estimation model.

Or

18. Explain in detail the various phases of project management.

(4 × 15 = 60 marks)

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FIFTH SEMESTER B.TECH. DEGREE (2014 SCHEME) EXAMINATION NOVEMBER 2020

Computer Science and Engineering

CS / IT / ME / AM / MT / PT 14 501—ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Section 1 (50 marks)

PART A

Answer any **four** *questions.*

Each question carries 5 *marks.*

1. Define the following :
   (a) Opportunity cost. (b) Non-recurring cost.
   (c) Recurring cost. (d) Incremental cost.
2. Draw a break-even chart and explain its components.
3. Write the methods of measuring national income.
4. Calculate the effective interest rate if the nominal interest rate is 16% and the interest is compounded every two months.
5. What is payback period? Explain with an example.

(4 × 5 = 20 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

6. (A) Describe the factors influencing supply.

Or

(B) Illustrate the effect of price on demand and supply using a suitable diagram.

7. (A) Explain single payment present worth factor.

Or

(B) A finance company advertises two investment plans. In plan 1, the company pays Rs. 12,000 after 15 years for every Rs. 1,000 invested now. In plan 2, for every Rs. 1000 invested, the company pays Rs. 4,000 at the end of the 10th year and Rs. 4,000 at the end of the 15th year. Select the best investment plan form the invertor's point of view at = 12%, compounded annually.

(2 × 15 = 30 marks)

Turn over

Section 2 (50 marks)

PART A

Answer any **four** *questions.*

Each question carries 5 *marks.*

1. Mention the four important characteristics of planning in management.
2. Draw the flow diagram of job analysis and explain the significance of each step.
3. Write the important of training of human resources.
4. Narrate the rules of credit and debit.
5. What is an incentive? State the kinds of incentives.

(4 × 5 = 20 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

6. (A) Elaborate on Faylor's principles of management.

Or

(B) Elaborate on the objectives of Human Resource Management.

7. (A) Explain the importance of costing as an aid to management.

Or

(B) What is a critical path? Explain the procedure for calculating critical path.

(2 × 15 = 30 marks)

D 92162 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 507 (D)—CIVIL ENGINEERING DRAWING—II

Time : Three Hours Maximum : 100 Marks

Part A

Compulsory :

1. (A) The line diagram shows a residential building with dimension in mm shown in Fig. 1.

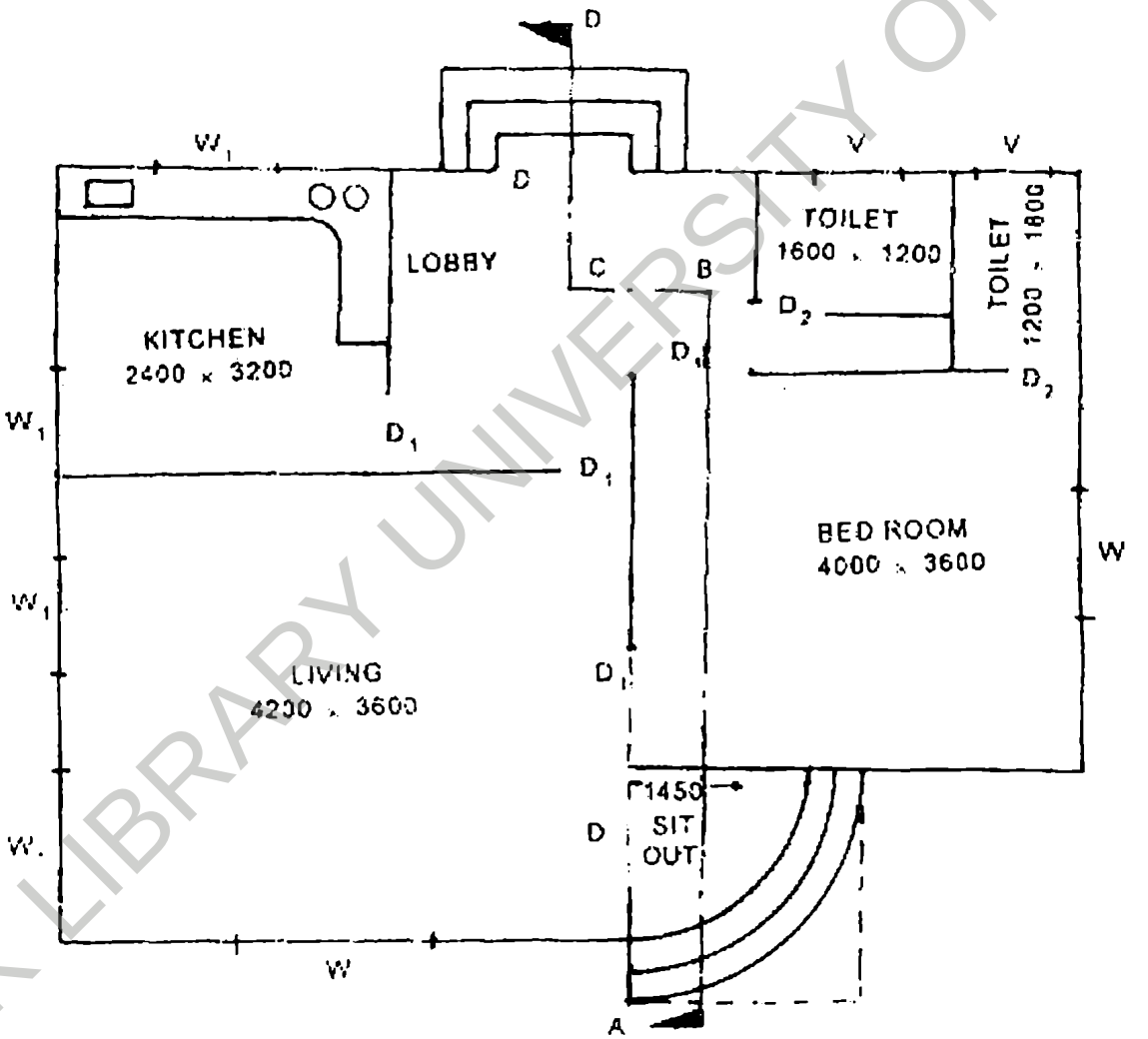

Figure 1

Draw (a) Plan and (b) section along A-B-C-D and (c) front elevation to the scale of 1:50 considering the following information : —

Foundation : All the walls are taken to depth of 900 mm below ground level and C.C bed 700 mm wide and 300 mm thick. Footing with brick masonary 400 mm wide and 600 mm depth.

Basement : The height of basement is 450 mm and width of wall is 300 mm. Steps are provided both on front side and rear side over a C.C bed of 150 mm thick with an offset of 150 mm on all three sides. Tread and rise of steps are 300 mm and 150 mm.

Flooring : Flooring consists of 20 mm thick C.M. 1:4 over a bed of cement concrete (1:4:8) 100 mm thick. The remaining part of the basement is filled and compacted with sand.

Superstruture & Roofing : All the walls are taken to a height of 3200 mm and 200 mm thick. Roofing consists of R.C.C. slab roofing 120 mm thick and projected by 200 mm beyond the outer face of walls. The roof slab is provided with weatherproof course 15 mm thick.

Sunshades : Continuous sunshade is provided on front side of the building. The thickness of sunshade at the wall end is 75 mm and at the free end thickness is 50 mm. Isolated sunshades are provided over windows and external doors extending the R.C.C Lintels kept over such openings on other three sides.

The projection of sunshades is extended 600 mm from the face of wall.

Lintels : R.C.C lintels on all openings like doors, windows, and cupboards are 150 mm thick having a bearing of 150 mm on either side.

Doors, Windows & Cupboards :

D 2No. 1000 × 2100 mm Fully Panelled Door

D1	4No. 1000 × 2000 mm Flushed Door
D2	2No. 900 × 1800 mm Flushed Door
W1	2No. 1500 × 1200 mm Glazed Window
W2	4No. 1000 × 1200 mm Glazed Window
CB	1 No. 1500 × 1200 mm Cupboard
A	1 No. 2500 × 2000 mm Almairah

(3 × 20 = 60 marks)

(B) Draw the elevation and vertical sectional views of a fully panned window as per Indian standards assuming suitable dimensions.

(10 marks)

Part B

Answer any **two** *questions.*
Each question carries 15 *marks.*

2. Draw the line diagram of a single storey two bedroom residential building with the layout of water supply indicating Communication Pipe, Shower, Ferrule, Tap, Sink, Doors, Water main, Stop cock, Washbasin, Service pipe, etc.
3. Design and sketch septic tank and soak pit to Indian standards for 1 cubic meter capacity and 24 hours detention time.
4. Identify the electrical fixtures shown in Fig.2.

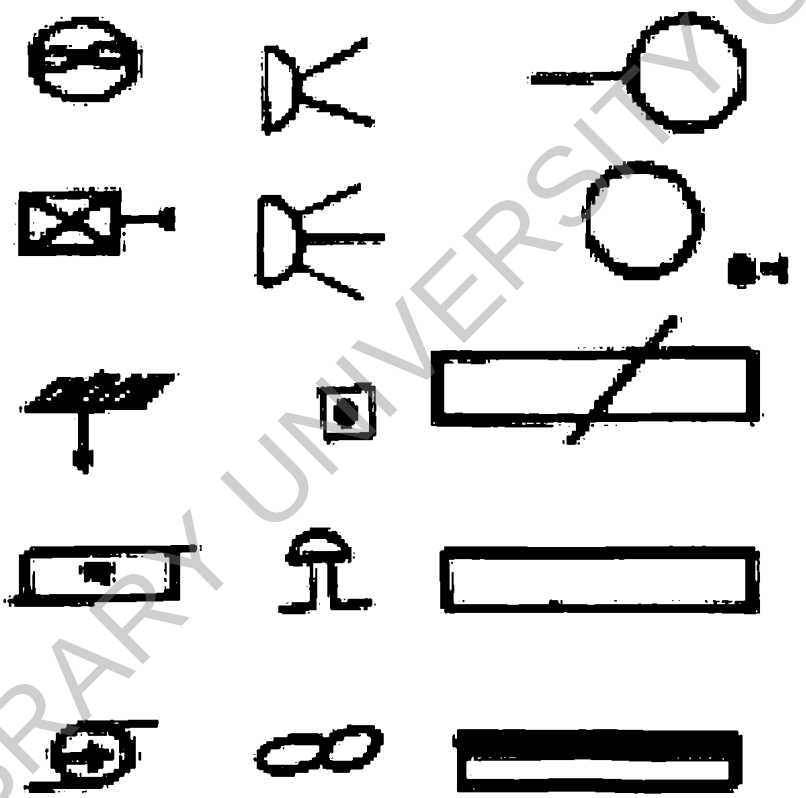

Figure 2.

(2 × 15 = 30 marks)

D 92161 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 506—OPEN CHANNEL HYDRAULICS AND HYDRAULIC MACHINERY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Differentiate between open channel flow and pipe flow.
2. What is Chezy's formula ? How is it derived ?
3. Explain in details about the concept of specific energy.
4. Explain non-uniform flow with examples.
5. List down the basic assumptions while deriving the dynamic equation for a gradually varied flow.
6. Write short notes on hydraulic jump and surge.
7. Explain in details about the classification of hydraulic jump.
8. List out and explain the various losses that occur during the operation of a pump.
9. What are the applications and disadvantages of a Kaplan turbine ?
10. Write short notes on air vessels.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) A canal of trapezoidal section has bed width of 8 m. and bed slope of 1 in 4000. If the depth of flow is 2.4 m. and side slope of the channel are 1 in 3, determine the average flow velocity and the discharge carried by the channel. Also calculate the average shear stress at the channel boundary. Take the value of Chezy's constant is 55.

Or

(b) Describe various types of flow in an open channel.

12. (a) Find the slope of the free water of a rectangular stream 10 m. wide and 2 m. deep. The slope of the stream bed is 1 in 5000. Total discharge is 20 m^3/s. Assume C = 65 and that the depth is increasing in the direction of flow.

Or

(b) Explain in detail about direct step method for surface profile determination.

13. (a) A spillway discharges a flood flow at a rate of 7.75 m^3/sec./m. width. At the discharge horizontal apron the depth of flow was found to be 0.5 m. What is the tail water depth needed to form a hydraulic jump ? If a jump is formed, find (i) Type ; (ii) Length ; (iii) Head loss ; (iv) Energy loss as a rectangular of the initial energy.

Or

(b) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/s. and depth of flow 0.4 m. The width of the channel is 8 m. Determine whether hydraulic jump will occur and if so find the height and loss of energy per kg. of water. Also determine the power lost in the hydraulic jump.

14. (a) Write short notes on :

(i) Impulse turbine.

(ii) Reaction turbine.

Or

(b) The internal and external diameters of the impellers of an impeller of centrifugal pump are 200 m. and 400 mm. respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller/unit weight of water.

(4 × 15 = 60 marks)

D 92160 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 505—GEOTECHNICAL ENGINEERING—I

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions :

1 What do you mean by 3-phase soil system ?

2 Define specific gravity and degree of saturation.

3 A soil sample has a porosity of 41 %, a moisture content of 15.2 % and a specific gravity of 2.65. Determine the degree of saturation and the air void ratio.

4 State and explain Darcy's law.

5 List the advantages of direct shear test.

6 Mention the types of consolidation.

7 Differentiate between Consolidation and Compaction of soil.

8 Enumerate the assumptions made in Rankine's theory.

9 Define active and passive earth pressure.

10 What is the critical height of an unsupported vertical cut in cohesive soil ?

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions :

11 How does a pycnometer measure specific gravity ? Describe the same in detail.

Or

12 Explain the BIS classification for soil system.

13 The water table in a certain area is at a depth of 4 m. below the ground surface. To a depth of 12 m., the soil consists of every fine sand having an average voids ratio of 0.7. Above the water table, the sand has an average degree of saturation of 50 %. Calculate the effective pressure on a horizontal plane at a depth 10 meters below the ground surface. What will be the increase in the effective pressure if the soil gets saturated by capillarity upto a height of 1 m. above the water table ? Assume G = 2.65.

Or

14 Explain about direct shear test and its significance in geotechnical engineering work.

Turn over

15 Explain the principle of consolidation based on spring analogy.

Or

16 Explain the different methods of compaction adopted in the field.

17 Explain Culmann's graphical method for the determination of active earth pressure.

Or

18 Elaborate the friction circle method for the analysis of slopes.

(4 × 15 = 60 marks)

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FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 504—STRUCTURAL ANALYSIS—II

Time : Three Hours Maximum : 100 Marks

Part A

I. Answer any *eight* questions out of ten. Each question carries 5 marks :

1 Explain moment distribution procedure in detail.

2 What are slope deflection equations ? Explain in detail.

3 Write the application of moment distribution method to continuous beams with fixed ends.

4 Explain in detail about symmetrical frames with a neat diagram and equations.

5 What are the causes of side sway and how will it be prevented ?

6 Write in detail about classification of frames with a neat diagram.

7 What are the assumptions made in analysis of frame by cantilever method.

8 Explain in detail about beams curved in plan.

9 Explain in detail about kinematic method for analysis of beams.

10 What are the assumptions made in plastic theory ? Explain in detail.

(8 × 5 = 40 marks)

Part B

II. Answer *all* questions. Each question carries 15 marks :

11 Draw the moment diagram for the frames as shown in Figure 1. Keep EI as constant for all the members. Use the slope deflection method for analysis :

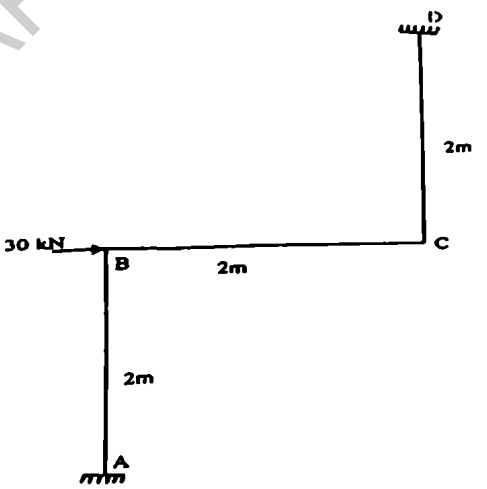


Figure 1

Or

12. A Continuous beam ABCD 20 m long is simply supported at its ends and is propped at the same level at B and C as shown in Figure 2 :

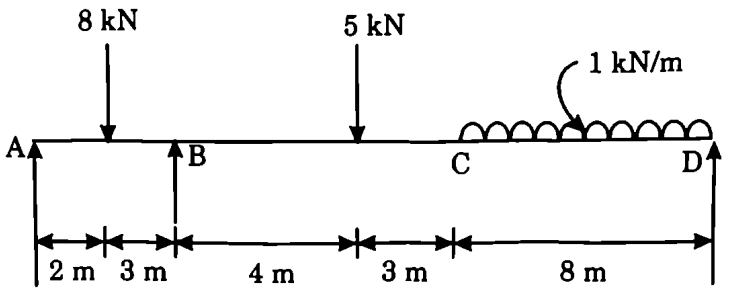


Figure 2

13. A three span beam ABCD has different moment of inertia and is loaded as shown in Figure 3. Find the reaction and support moment and draw the shear force and bending moment diagram :

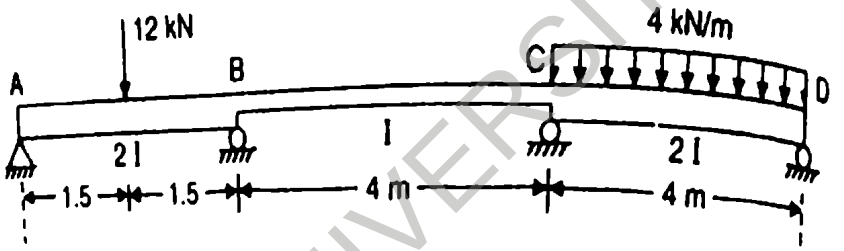


Figure 3

Or

14. Analyze the portal frame as shown in Figure 4 by Kani's method. Draw the Bending Moment Diagram and sketch the deflected shape of the frame. Take EI as constant for all the members :

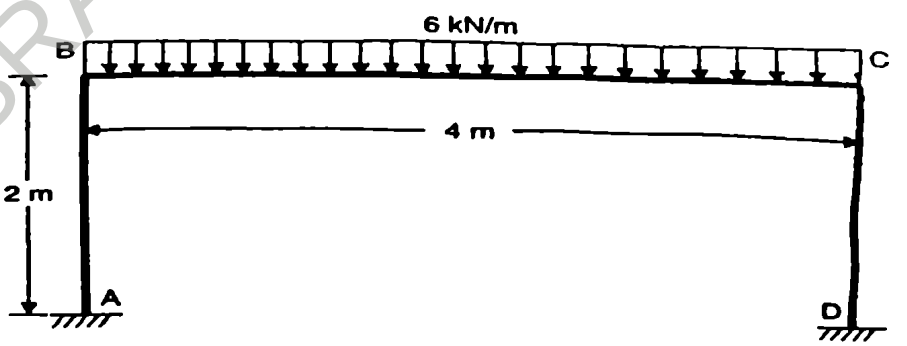


Figure 4

15. In Figure 5, wind loads are transferred to joints A, D and G are 12 kN, 24 kN and 24 Kn respectively. Analyse the frame by Portal Method :

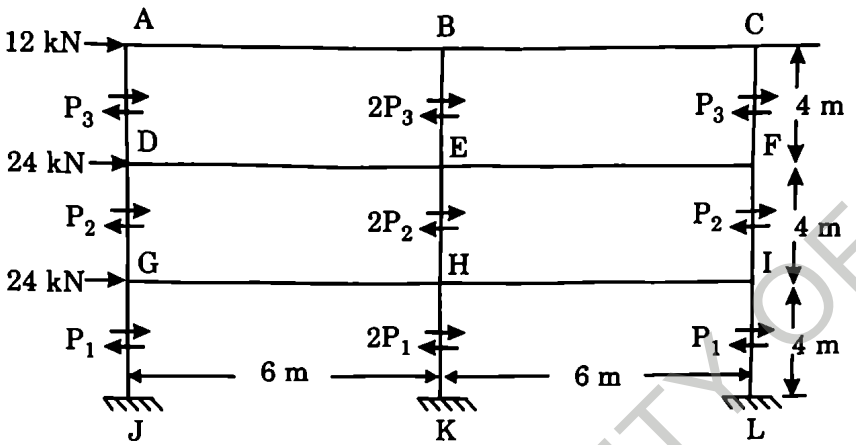


Figure 5

Or

16. Analyse the frame shown in Figure 6 by Cantilever method .Take cross-sectional areas of all columns as the same.

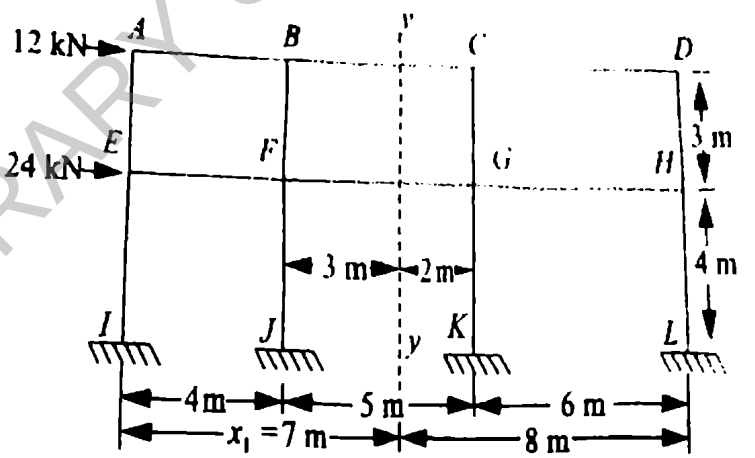


Figure 6

17. Determine the collapse load in a fixed beam of span L carrying uniformly distributed load over one-half of span as in Figure 7. The plastic moment capacity is M_p throughout.

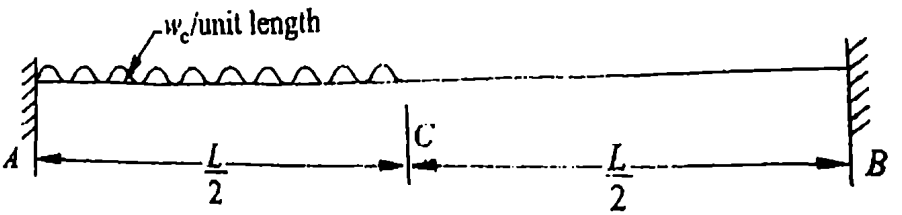


Figure 7

Or

18. Determine the plastic moment capacity of the frame for the loading as given in Figure 8. Assume same section is used throughout.

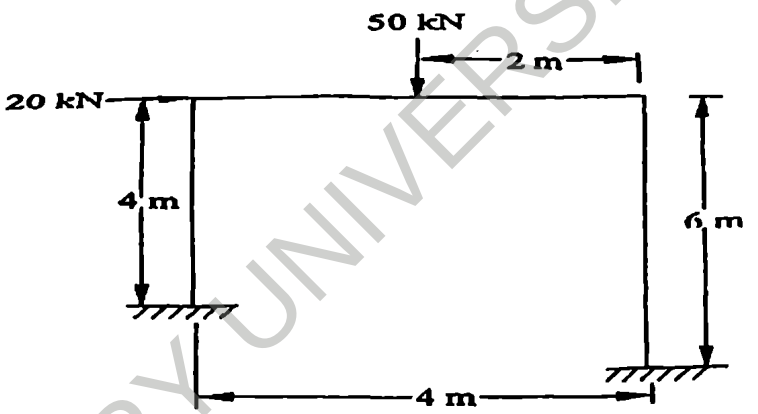


Figure 8

(4 × 15 = 60 marks)

D 92158 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 503—TRANSPORTATION ENGINEERING—I

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Discuss the role of transportation in the economic and social activities of the country.
2. Explain stopping sight distance (SDD) and the factors on which it depends.
3. What are the scopes and major sections of traffic engineering ?
4. Why the spot speed study is important in traffic engineering ?
5. Describe the various aspects to be investigated during parking studies.
6. What are all the desirable properties required for a soil as a highway material ?
7. State the factors to be considered when design of pavements.
8. What are the objectives of airport planning ? Explain.
9. Explain the difference between runway and taxiway with neat sketch.
10. What are airport zones ? Why are they important ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Calculate the length of transition curve and the shift using the following data. Design speed = 65 kmph, Radius of circular curve = 220 m., allowable rate of introduction of super elevation = 1 in 150 (pavement rotated about thc centre line) and pavement width including extra widening = 7.5 m.

Or

(b) Explain the four stages of engineering survey for highway locations.

12. (a) Explain the various road users characteristic to be considered in the design of roads.

Or

(b) In spot speed studies determine the (i) upper and lower values or speed limits for regulation of mixed traffic flow and (ii) the design speed for checking the geometric design elements of the highway from the following data. (Note : use upper, lower and design element speed as 85th, 15th and 98th percentile speed respectively).

Speed range (kmph)	No. of vehicles observed	Speed range (kmph)	No. of vehicles observed
0 to 10	12	50 to 60	255
10 to 20	18	60 to 70	119
20 to 30	68	70 to 80	43
30 to 40	89	80 to 90	33
40 to 50	204	90 to 100	9

13. (a) Explain briefly the various types of test used for finding the suitability of aggregates in road construction.

Or

(b) Explain step-by-step construction procedure of WBM road.

14. (a) Briefly discuss the factors you would keep in view, while selecting a suitable site for an airport.

Or

(b) An airport at sea level and with standard conditions has the runway length for takeoff and landing as 2100 m. and 2300 m. respectively. The altitude of the proposed airport is 160 m. The airport reference temperature is 28° C. and the effective runway gradient is 0.3 %. Compare the length of runway to be provided.

(4 × 15 = 60 marks)

D 92157 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 502—BUILDING TECHNOLOGY—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Write short notes on prefabricated construction with examples.
2. Explain the concept of framed structure with neat sketch.
3. Discuss with short notes on slip form construction.
4. Write short notes on fire escape with alarm system.
5. Why the planning of plumbing service is very important in building ? Explain.
6. Write short notes on lighting requirements of different building.
7. Differentiate mechanical and natural ventilation.
8. Explain the basic principles of filler slab with its merits.
9. Write short notes on structural considerations for earthquake safe buildings.
10. Explain in brief the causes of earthquake.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Write short notes on reinforced concrete columns, beams and slab.

Or

(b) List out the design considerations for passenger's elevator and types of escalator.

12. (a) Explain the various fair resisting properties of building materials.

Or

(b) Draw a typical drainage system in two storey building. Indicate the components and their functions.

13. (a) Discuss in brief various types of thermal insulating materials.

Or

(b) Write short notes on :

(i) Acoustic requirement of auditorium.

(ii) Acoustic materials and how to solve acoustic problem.

14. (a) List out and explain different types of foundation failure.

Or

(b) What are the factors to be considered for designing earthquake resistance building ?

(4 × 15 = 60 marks)

D 92156 (Pages : 6) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 14 501—STRUCTURAL DESIGN—I

Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*
Each question carries 5 *marks.*

1. Classify loads acting on a structure with examples.
2. The cross-section of a singly reinforced concrete beam is 30 cm. wide and 40 cm. deep to the centre of the reinforcement which consists of four bars of 14 mm. in diameter. If the stresses in concrete and steel are not to exceed 50 kg/cm^2 and 1400 kg/cm^2. Determine the moment of resistance of the section. Take m. 18.
3. A doubly reinforced concrete beam is 25 cm. wide and 50 cm. deep to the centre of tension reinforcement. The centre of compression steel is 5 cm. from the compression edge. The areas of the compression and tension steel are respectively 10.16 cm^2 and 12.56 cm^2. If m = 18 and the bending moment at the section is 7×10^5 kgcm. Calculate the stresses in concrete and steel.
4. Find the moment of resistance of a singly reinforced concrete beam of 200 mm. width 400 mm effective depth, reinforced with 3-16 mm. diameter bars of Fe 415 steel. Take M 20 grade of concrete.
5. The plan of a ground floor column in a building is shown in Figure. 1. It is desired to reduce the longitudinal bar diameter from 28 mm. to 20 mm. above the second floor level. Determine a suitable lap length. Assume M 25 concrete and Fe 415 steel.

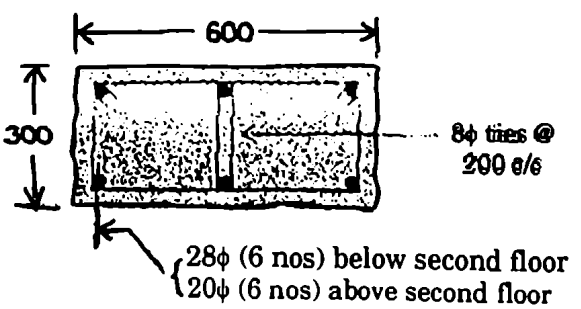


Figure 1

Turn over

6. Determine the design moments in a square slab (4 m. × 4 m.) with three edges continuous and one edge free, subject to 3 uniformly distributed factored load 10.0 kN/m^2. Assume the slab to be isotropically reinforced. Also assume that the 'negative' moment capacity at the continuous support to be equal to that at midspan in either direction.

7. List the steps to be followed in the design of a RCC slab.

8. A short column 30 cm. × 30 cm. in section is reinforced with 8 bars of 22 mm. diameter. Find the safe load on the column as per the IS code permissible stress in concrete and steel are 4 N/mm^2 and 130 N/mm^2 respectively.

9. Classify columns based on the types of reinforcement loadings and slenderness ratio.

10. A flight of stairs to be provided in an office building is to be supported by a stringer beam on one edge and a brick wall and on the other ; the effective horizontal span of the stairs may be as 1.5 m. The raisers are 150 mm. and the treads are 270 mm. Design the steps allowing a live load of 3000 N/m^2. Use M 15 concrete.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 15 *marks.*

11. Design a singly reinforced beam to carry a live load of 14,500 N/m. run. The clear span of the beam is 5.5 m. the bearing at each end is 300 mm. Use M 15 Concrete.

Or

12. A rectangular reinforced concrete beam, located inside a building in a coastal town, is simply supported on two masonry walls 230 mm. thick and 6 m. apart (centre-to centre). The beam has to carry, in addition to its own weight, a distributed live load of 10 KN/m and a dead load of 5 KN/m. Design the beam section for maximum moment at midspan. Assume Fe 415 steel.

13. Check the Adequacy of the anchorage provided for the longitudinal bars in the cantilever beam shown in Figure. 2 and suggest appropriate modifications, if required. The beam is subjected to a uniformly distributed factored load of 100 kN (total, including self-weight). Assume M 20 concrete and Fe 415 steel, deformed bars.

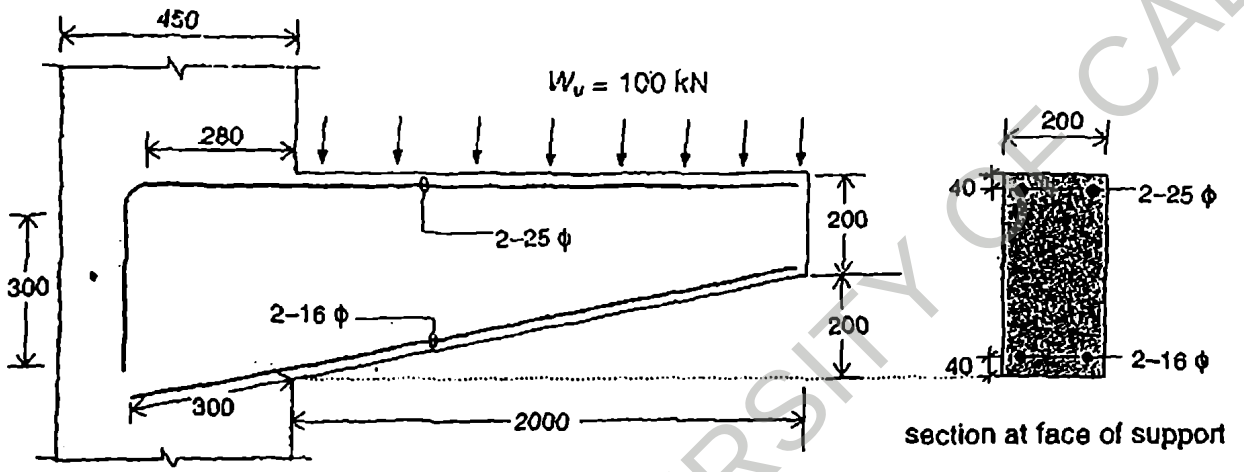


Figure 2

Or

14. Check the bond requirement of the continuous beam of Figure 3. if the factored shear force is 200 kN at the point of inflection. Assume M 20 and Fe 415.

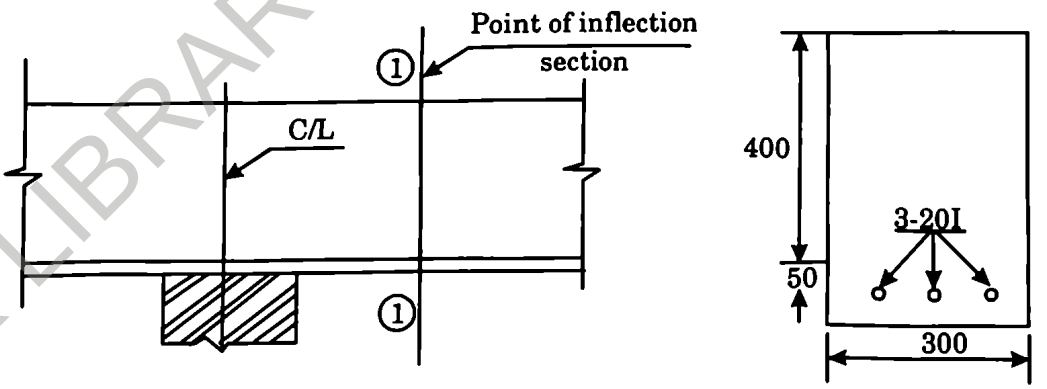


Figure 3

Turn over

15. Design a simply supported slab to cover a room with internal dimensions 4.0 m. × 5.0 m. and 230 mm. thick brick all around. Assume a live load of 3 kN/m^2 and a finish load of 1 kN/m^2. Use M 20 concrete and Fe 415 steel. Assume that the slab corners are free to lift up. Assume mild exposure conditions.

Or

16. The plan of a floor slab system, covering an area 8.0 m. × 14.5 m. (clear spans) is shown in Figure. 4. The slab rests on a 230 mm. thick masonry wall all around. For economy, the span of the slab is reduced by providing three (equally spaced) intermediate beams along the 8.0 m direction, as shown. The specified floor loading consists of a live load of 4 kN/m^2, and a dead load (due to floor finish, partitions etc.) of 1.5 kN/m^2 in addition to the self-weight. Assuming Fe 415 steel, design and detail the floor slab. Assume the beam is subjected to moderate exposure conditions.

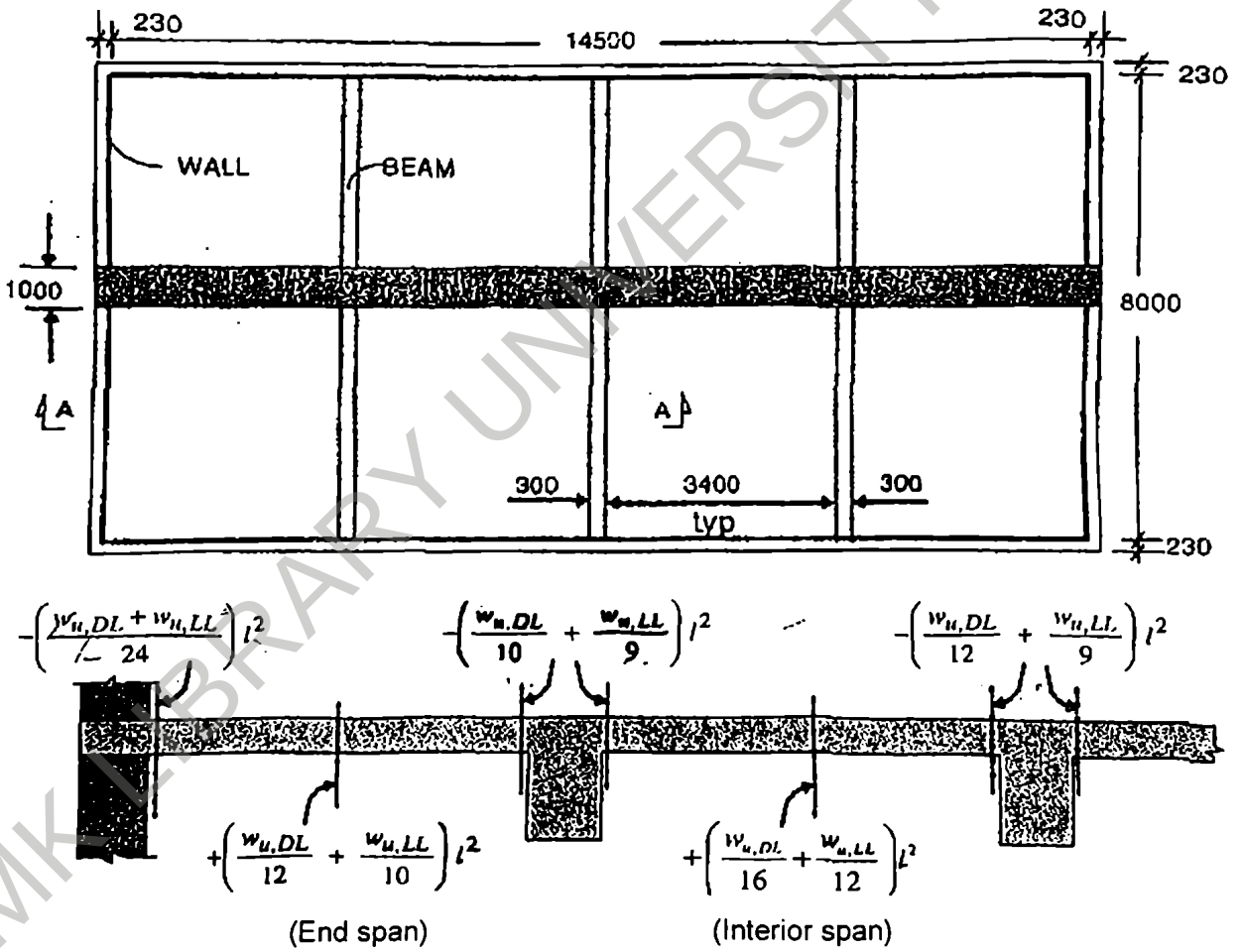


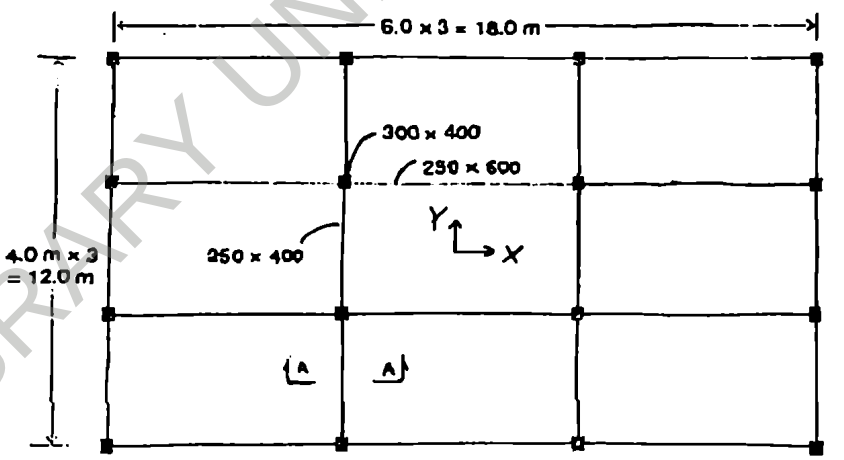
Figure 4

17. A straight staircase is made of structurally independent tread slabs, cantilevered from a reinforced concrete wall. Given that the riser is 150 mm, tread is 300 mm, and width of flight is 1.5 m, design a typical tread slab. Apply the live loads specified in the IS Loading Code for stairs liable to be overcrowded. Use M 20 concrete and Fe 250 steel. Assume mild exposure conditions.

Or

18. The framing plan of a multi-storeyed building is shown in Figure 5 (a). Assume that all the columns have a size 300 mm. × 400 mm ; the longitudinal beam (global X- direction) have a size 250 mm. × 600 mm. and the transverse beams (global Y- direction) have a size 250 mm. × 400 mm. as shown. The storey height h = 3.5 m. For a column in a typical lower floor of the building, determine the effective lengths.

I_{ex} and I_{ey} with respect to the local x-and y-axes (major and minor), as shown in Figure 5 (b). For the purpose of estimating the total axial loads on the columns in the storey, assume a total distributed load of 35 kN/m^2 from all the floors above (combined). Also assume M 25 grade concrete for the columns and M 20 grade concrete for the beams.



Typical Framing Plan

Figure 5 (a)

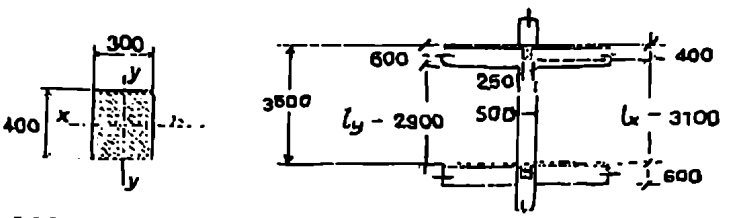


Figure 5 (b)

(4 × 15 = 60 marks)

D 92154 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 14 505—POWER ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the various types of power diodes.
2. Compare Power MOSFET with IGBT.
3. Draw and explain the operation of a single-phase AC voltage controller feeding resistive load.
4. Explain how a free wheeling diode improves power factor in a converter.
5. With circuit diagram, explain the principle of operation of a step down chopper.
6. Explain different types of UPS with block diagram.
7. Explain the working principle of Class C chopper.
8. Describe SMPS with push pull configuration.
9. Draw and explain driver circuits for IGBT.
10. Write short notes on negative linear voltage regulators.

(8 × 5 = 40 marks)

Part B

Answer section (a) **or** *section (b) of each question.*
Each question carries 15 *marks.*

11. (a) Draw and explain the V-I characteristics of SCR. Also define latching and holding current.

Or

(b) Explain the construction, operation and applications of TRIAC with neat sketches.

12. (a) Explain the power factor improvement techniques used in controller rectifiers.

Or

(b) Explain the working of single-phase fully controlled bridge rectifier with RL load and draw the relevant waveforms.

13. (a) Explain the principle of operation of Mc Murry Bedford full bridge inverter with cirucit diagram and waveforms.

Or

(b) Describe the principle of step-up chopper. Derive the expression for the average output voltage in terms of input voltage and duty cycle.

14. (a) With circuit diagram and waveforms, explain the operation of buck-boost converter. Also derive output voltage equation.

Or

(b) Explain the methods for control of role of power electronic circuits using microprocessors and microcontrollers.

(4 × 15 = 60 marks)

D 92153 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 14 504—BIOMEDICAL INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the different components of man-instrument system using block diagram.
2. Draw and explain Needle electrodes.
3. With the help of a neat diagram, explain phonocardiography.
4. Explain Einthoven triangle.
5. What is fibrillation ? Explain the working of a defibrillator.
6. Explain how a spirometer can be used for respiratory volume measurement.
7. Discuss the principle and application of diathermy.
8. Explain the principle of operation of endoscopy.
9. Explain the single channel telemetry system for ECG transmission.
10. Explain the principle of electromagnetic blood flow meter.

(8 × 5 = 40 marks)

Part B

Answer section (a) **or** *(b) of each question.*
Each question carries 15 *marks.*

11. (a) With neat sketch, explain any two types of physiological transducers and its applications.

Or

(b) Explain the equivalent circuit of bio-potential electrode interface. Also explain different bio-potential electrode used to measure bioelectric events.

12. (a) With the help of a diagram, explain briefly about one direct and indirect blood pressure measurement.

Or

(b) Explain Photoelectric and capacitance plethysmograph for measurement of blood flow with the help of neat diagram.

Turn over

13. (a) With a block diagram, describe the different types of cardiac pacemakers used in medical fields.

Or

(b) Explain how nerve conduction velocity is calculated. Draw the block diagram of EMG measurement and explain the need for each block.

14. (a) Explain the causes of electric shock hazards in hospitals. What are the precautions to minimize electric shock hazards ?

Or

(b) Explain computer tomography with a necessary diagram.

(4 × 15 = 60 marks)

D 92152 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Engineering

AI 14 503—CONTROL ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

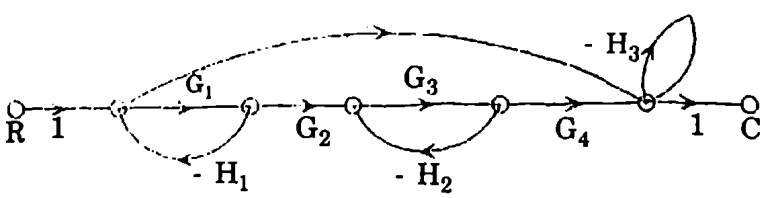
1. The impulse response of a system is $C(t) = -t\,e^{-t} + 2e^{-t}$ when $t > 0$. Find transfer function.
2. Distinguish between open loop and closed loop system.
3. Explain delay time, Rise time specification of a second order systems.
4. What is root locus ? What is the information obtained from root locus ?
5. Explain Gain margin and Phase margin.
6. State and explain Nyquist stability criterion.
7. Explain IAE and ISE.
8. Describe composite control modes.
9. With the help of a neat diagram, explain the various time domain specifications.
10. Define transfer function and derive transfer function of an RC network.

(8 × 5 = 40 marks)

Part B

Answer Section (a) **or** *Section (b) of each question.*

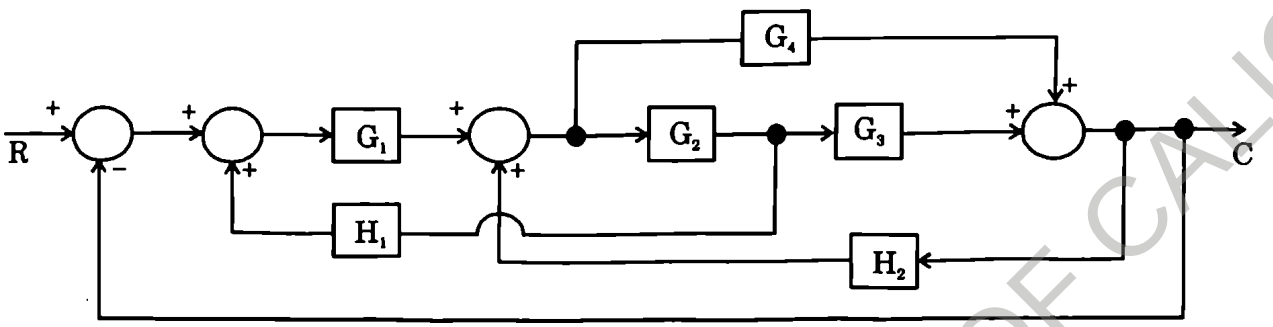
11. (a) Find the overall transfer function of the signal flow graph given below using Mason's



Gain formula.

Or

(b) Find the transfer function of the given system using block diagram reduction method :



12. (a) Sketch the root locus for a system with :

$$G(s)H(s) = \frac{K}{s(s+2)\left(s^2+2s+2\right)}.$$

Or

(b) Explain (i) Absolute stability ; (ii) Relative stability ; (iii) static and dynamic error coefficients.

13. (a) The open loop transfer function of a unity feedback system is :

$\frac{10}{s(s+2)(s+5)}$. Draw Bode plot and find Gain margin and phase margin.

Or

(b) Explain the significance of M-N charts and Nichols charts.

14. (a) Describe the circuit realization of composite control schemes.

Or

(b) Explain IAE, ISE, ITAE and quarter decay ratio.

(4 × 15 = 60 marks)

D 92151 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Applied Electronics and Engineering

AI 14 502—SIGNALS AND SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Describe linear and non-linear systems.
2. Check whether the system $Y(n) = X(-n)$ is time variant or not.
3. Explain odd signals and even signals.
4. Find Fourier Transform of the function $f(x) = e^{-a|x|}, -\infty < x < \infty$.
5. Describe Hilbert Transform.
6. Explain the properties of Laplace transform.
7. Find the DTFT of an exponential sequence : $x[n] = a^n u[n]$ where $|a| < 1$.
8. Explain Bilateral and Unilateral Z-transform.
9. Find Z transform $X(n) = u(n) - (0.5)^n u(n)$.
10. Describe Linear Time Invariant system.

(8 × 5 = 40 marks)

Part B

Answer section (a) **or** *(b) of each question.*
Each question carries 15 *marks.*

11. (a) Explain convolution of continuous time signals. Also explain the properties of convolution integral.

Or

(b) With the help of examples, explain the basic operation on signals.

12. (a) Explain the properties of Fourier Transforms with necessary proof.

Or

(b) A filter has input $x(t) = e^t u(t)$ and the impulse response $h(t) = e^{-2t} u(t)$. Find energy spectral density and power spectral density of the output.

Turn over

13. (a) Explain the properties of Discrete Fourier Transform with necessary proof.

Or

(b) Describe Laplace Transform. Also find the Laplace Transform of the signal $X(t) = \sin(wt)\, u(t)$.

14. (a) Explain Z-transform. Also find the response of the system $S(n + 2) - 3S(n + 1) + 2S(n) = \delta(n)$. When all the initial conditions are zero.

Or

(b) Describe the process of determining the frequency response from poles and zeros using Z transform.

(4 × 15 = 60 marks)

D 92149 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 506—ELECTRICAL MATERIAL SCIENCE

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 What is electrical conductivity ? Obtain the expression for electrical conductivity of a metal.

2 Write short notes on ferrites.

3 Explain the magnetic materials used in electrical machines.

4 Define polarization and what are different polarization processes.

5 Explain the properties of Mica and Ceramics.

6 List the properties of good insulator.

7 State the factors affecting dielectric strength.

8 Explain Bubble theory.

9 What are the materials used for solar cells ? Explain.

10 Give the details of solar cell parameters.

(8 × 5 = 40 marks)

Part B

Answer any **four** *questions.*
Each question carries 15 *marks.*

II. 1 Classify the magnetic materials and explain them in detail. Also distinguish hard and soft magnetic materials.

Or

2 State and explain Weiss theory of ferromagnetism with their applications.

3 Discuss any four dielectric parameters in detail.

Or

4 Explain the types of dielectric materials with its application.

5 Explain a break down mechanism in gases also discuss the factor on which dielectric strength of gaseous dielectric depends.

Or

6 Describe the applications of following insulating materials used in electrical apparatus :

(i) Liquid insulator ; (ii) Gaseous insulators ; (iii) Organic insulator ; (iv) Inorganic insulator.

7 Explain the following in detail :

(i) Antireflection coating.

(ii) Solar selective coating.

(iii) Cold mirror coating.

Or

8 Explain the construction and working of solar cell with its characteristics.

(4 × 15 = 60 marks)

D 92148 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 505—DIGITAL SYSTEM DESIGN

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 Explain functions and procedures.

2 Describe the functions of a test bench.

3 List the VHDL features for sequential logic design.

4 Briefly explain the analysis procedure of the combinational logic design.

5 Write the VHDL code for a 3 to 8 decoder.

6 Explain about circuit timing.

7 What do you mean by pipelined output ?

8 What are tri-state devices ? Explain.

9 Draw the ASM chart for a full adder.

10 Describe about switch matrix.

(8 × 5 = 40 marks)

Part B

Answer any **four** *questions.*
Each question carries 15 *marks.*

II. 1 What are the various ways in which types, constants and arrays are defined in VHDL ?

Or

2 Explain the functions and elements of Behavioural and Structural description in VHDL.

3 Write the VHDL code for 3-bit adder and comparator.

Or

4 (i) Explain bubble-to-bubble logic design.

(ii) Write the VHDL code for a 2 to 4 decoder in all 3 styles of modelling.

Turn over

5 Design a sequential circuit with two DFFs A and B, and one input x. When $x = 0$ the state of the ciruit remains the same. When $x = 1$, the circuit goes through the state transition from 00 to 01 to 11 to 10 and back to 00 and repeats.

Or

6 With a suitable example design a synchronous circuit and describe its state table, state equations and state diagram.

7 Find the hazard free implementation of the function :

$f(x_1,\ldots x_4) = \Sigma m\ (0, 4, 11, 13, 15) + D\ (2, 3, 5, 10)$.

Or

8 (i) Explain the components and salient features of the ASM chart (6).

(ii) Draw the ASM chart for a parity generator.

(4 × 15 = 60 marks)

D 92147 **(Pages : 2)** **Name.....**

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 504—ANALOG AND DIGITAL COMMUNICATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 Derive the relationship between total power and carrier power in AM.

2 Explain the need for DSB-SC and SSB modulation.

3 Differentiate frequency and phase modulation.

4 State central limit theorem.

5 Outline Ergodic processes and Gaussian processes.

6 Prepare the input output relation for a power spectral density and cross spectral density.

7 List the advantages and disadvantages of digital communication system.

8 Outline the causes for ISI.

9 State the principle of power line carrier communication.

10 Explain circuit switched network.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

II. 1 (i) Show the phasor representation, current relation and efficiency of AM.

(ii) In a super heterodyne receiver the input AM signal has a centre frequency of 1425 kHz and bandwidth 5 kHZ. The input is down converted to 455 kHz. Identify the image frequency.

Or

2 What are the methods of FM generation and explain an indirect method to generate an FM signal ?

3 Generalize the equation for finding the probability density function of a one to one differential function of a given random variable.

Or

4 (i) Write about Transmission of random process through a Linear Time Invariant (LTI) filter.

(ii) Find the autocorrelation of a sequence $x(t) = A \cos (2\pi fc\ (t + \theta)$ where A and fc are constant and θ is a random variable that is uniformly distributed over the interval $[-\pi, \pi]$.

5 Distinguish various Pulse Modulation Techniques.

Or

6 (i) What is digital modulation scheme ? Derive geometrical representation of signal.

(ii) Write about the geometric representation of BPSK signal and BFSK signal.

7 (i) Explain the types of coupling.

(ii) Write short notes on power line modems and networks.

Or

8 (i) Explain about TDMA and CDMA.

(ii) With a neat diagram, explain OSI reference model.

(4 × 15 = 60 marks)

D 92146 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 503—ELECTRICAL MACHINES—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 Explain the advantages of salient pole type construction used for synchronous machines.

2 Differentiate single layer and double layer winding.

3 What is the necessity of chording in the armature winding of a synchronous machine ?

4 Distinguish between the 'Shnchronous reactance' and the 'Potier reactance' of a synchronous generator.

5 Explain the causes of voltage drop in an alternator when loaded.

6 What is meant by synchronizing ? State the conditions for paralleling alternator with infinite busbars.

7 Point out why synchronous motor is not a self-starting motor.

8 Discuss about 'Torque angle'.

9 What are the factors that influence the choice of specific magnetic loading in synchronous machines ?

10 Mention the effect of SCR on a machine's performance.

(8 × 5 = 40 marks)

Part B

Answer any **four** *questions.*
Each question carries 15 *marks.*

II. 1 (i) The stator of a 3-phase, 16 pole alternator has 144 slots and there are 4 conductors per slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375 r.p.m., calculate the e.m.f. induced per phase. Resultant flux in the air-gap is 0.05 webers per pole sinusoidally distributed. Assume the coil span as 1500 electrical.

(ii) Summarize winding factors of an alternator.

Or

2 (i) Explain phasor diagram of one phase of a synchronous generator and describe the features of synchronous impedance.

(ii) A 3-phase, 50 Hz, star-connected alternator with 2 layer winding is running at 600 r.p.m. It has 12 turns/coil, 4 slots/pole/phase and a coil-pitch of 10 slots. If the flux/pole is 0.035 Wb sinusoidally distributed, find the phase and line e.m.f.'s induced. Assume that the total turns/phase are series connected.

3 Describe how the direct and quadrature-axis reactances of a salient-pole synchronous machine can be estimated by means of slip test.

Or

4 Describe the parallel operation of three-phase alternators with help of a neat diagram.

5 (i) Explain briefly the features and principle of operation of three-phase synchronous motor.

(ii) Describe how the behaviour of a synchronous motor differ from that of a 3-phase induction motor.

Or

6 Draw the simplified equivalent circuit of synchronous motor and examine the effect of loading in synchronous motor at various power factors with help of phasor diagrams.

7 A 500 kVA, 33 kV, 50 Hz, 600 r.p.m., 3-phase salient pole alternator has 180 turns per phase. Estimate the length of air gap if the average flux density is 0.54 Wb/m.^{2}, the ratio pole arc to pole pitch 0.65; the short circuit ratio 1.2; the gap contraction factor 1.15 and the winding factor 0.955. The mmf required for gap is 80 percent of no load field mmf and the winding factor of 0.955.

Or

8 Calculate the stator dimensions for 5000 kVA, 3-phase, 50 Hz, 2 pole alternator. Take mean gap density of 0.5 Wb/m.^{2} specific electric loading of 25,000 ac/m., peripheral velocity must not exceed 100 m/s. Air gap may be taken as 2.5 cm.

(4 × 15 = 60 marks)

D 92145 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 502—ELECTRICAL POWER GENERATION, TRANSMISSION AND DISTRIBUTION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 State factors to be considered for selection and of site for the NPS.

2 What are the advantages of MHD power generation ?

3 Write the significance of load factor and diversity factor.

4 Generalize the factors affecting sag in a transmission line.

5 Explain the line supports used in transmission and distribution systems.

6 Define safety factor of insulator. Why it is desired to be high ?

7 How does a.c. distribution differ from d.c. distribution ?

8 Give the expression for the insulation resistance of a single core cable.

9 Discuss how inductance and capacitance of transmission line are affected by the spacing between the conductors.

10 What is the effect of leading load power factor on voltage regulation of a short transmission line ?

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

II. 1 Draw the schematic diagram of hydro electric power station. State the different methods of classifying hydro electric power plant and give the classification of HPS based on all three methods.

Or

2 A power station is to supply four regions of loads whose peak loads are 10000 kW, 5000 kW, 8000 kW and 7000 kW. The diversity factor of the load at the station is 1.5 and average annual load factor is 60 %. Calculate the maximum demand on the station and annual energy supplied from the station. Suggest the installed capacity and number of units taking all aspects into account.

Turn over

3 Derive an expression for sag of a line supported between two supports of the same height. Also explain the effect of ice and wind loading.

Or

4 A string of five insulator units has mutual capacitance equal to 10 times the pin to earth capacitance, find voltage distribution across various units as per cent of the total voltage across the string and string efficiency.

5 (i) A 2-wire d.c. distributor 200 meters long is uniformly loaded with 2A/m. Resistance of single wire is 0.3 ohm/km. If the distributor is fed at one end calculate :

(a) The voltage drop up to a distance of 150 m. from the feeding point.

(b) The maximum voltage drop.

(10 marks)

(ii) Write short notes on the Ring main distributor. (5 marks)

Or

6 With neat diagram, explain the various methods of grading of underground cables.

7 Derive the expression for calculation the internal and external flux linkages for a conductor carrying current. Use these expressions to derive the equation for the inductance of a single-phase transmission line.

Or

8 A balanced three-phase load of 30 MW is supplied 132 kV, 50 Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor $(20 + j\,52)$ ohm and the total phase neutral admittance is 315×10^{-6} Siemen. Using nominal T method. Determine (i) A, B, C and D constants of the line ; (ii) Sending end voltage ; (iii) Regulation of the line.

[4 × 15 = 60 marks]

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Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE 14 501—POWER ELECTRONICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

I. 1 Summarize the conditions under which a transistor operates as a switch.

2 Examine how is *di/dt* and *dv/dt* protection provided in SCR.

3 Describe the UJT triggering circuit.

4 Examine power factor of semi converter is better than full converter.

5 List and explain some application of converters.

6 Explain a method of voltage control used in an inverter.

7 Explain the function of feedback diodes in bridge inverter.

8 Write the principle of operation of cycloconverter.

9 Why forced commutation is used in DC chopper ?

10 Explain with neat block diagram the working of SMPS.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

II. 1 Examine the structure and different modes of operation with the characteristics of TRIAC.

Or

2 Summarize the various types of commutation circuits for SCR.

3 Describe the operation of three-phase semiconverter with R load and also draw the output voltage waveforms for 30° and 90°.

Or

4 Explain the operation of a single-phase full converter with RLE load using relevant waveforms. Obtain the expressions for its average output voltage and RMS value of output voltage.

Turn over

5 Describe the operation of 3-phase bridge inverter for 120 degree mode of operation with aid of relevant phase and line voltage waveforms.

Or

6 Draw and describe the circuit diagram of single-phase AC voltage controller with RL load. Explain the circuit operation with necessary waveforms.

7 (a) A step down DC Chopper has input voltage of a 230 V with 10 ohms load resistor connected, voltage drop across chopper is 2 V when it is ON. For duty cycle of 0.5. Calculate :

(i) Average and RMS value of output voltage. (5 marks)

(ii) Power delivered to load. (5 marks)

(b) What is constant frequency control of chopper ? (5 marks)

Or

8 Draw the circuit diagram of a buck converter and explain its operation with equivalent circuit for different modes and waveforms.

(4 × 15 = 60 marks)

D 92143 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 506—QUANTITATIVE TECHNIQUES AND MANAGERIAL DECISIONS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain about signle stage decision making.
2. Explain the term slack with reference to PERT.
3. Why inventory control is important for a company ? Explain.
4. Explain the significance of safety stock concept in inventory control.
5. Define stock and surplus variables.
6. What is degeneracy ? How to take care of this problem ?
7. Define the transportation problem.
8. Give the Mathematical formulation of assignment problem.
9. Explain about minimal spanning tree.
10. Explain about dynamic inventory model.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Discuss in detail about decision making models with suitable examples.

Or

(b) (i) With an example explain the minimal spanning tree algorithm. (8 marks)

(ii) How a network is constructed using CPM algorithm. (7 marks)

12. (a) Describe the EOQ model with an example.

Or

(b) Explain about one time mode P system and selective model technique.

13. (a) Write down the statement of LP problem. With an example show how feasible solutions are obtained for the given LP problem.

Or

(b) With a suitable example, explain the two phase method of obtaining solution to LP problem.

14. (a) A company has factories, F_1, F_2 and F_3 which supply warehouses at W_1, W_2 and W_3. Weekly factory capacities are 200, 160 and 90 units respectively. Weekly warehouse requirements are 180, 120 and 150 units respectively. Units shipping costs in Rs. are as follows :

Factory	*Warehousing*			*Supply*
	W_1	W_2	W_3	
F_1	16	20	12	200
F_2	14	8	18	160
F_3	126	24	16	90
Demand	180	120	150	150

Determine the optimum distribution for this company to minimise shipping costs using stepping stone method.

Or

(b) With a suitable example, explain the assignment problem.

[4 × 15 = 60 marks]

D 92142 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 505—MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the differences between CISC and RISC architectures.
2. Explain the 8086 flag register bit pattern.
3. How are parameters passed to a macro ?
4. Sketch the block diagram showing basic 8086 minimum mode configuration.
5. Draw and explain the interrupt acknowledge cycle in 8086.
6. Explain Absolute decoding and Linear decoding.
7. Explain control word formation with suitable example.
8. What is a DMA controller ? Explain.
9. Explain interrupt structure of 8051.
10. List the features of ARM processors.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Explain Memory segmentation and Memory addressing in 8086 Microprocessor.

Or

(b) With block diagram, explain the internal architecture of 8086 Microprocessor.

12. (a) With block diagram, explain the Maximum mode configuration of 8086 in detail.

Or

(b) Explain the function of following pins in 8086 :

(i) NMI ; (ii) MN/$\overline{MX}$; (iii) $\overline{TEST}$; (iv) $\overline{BHE}$; (v) DT/$\overline{R}$; (vi) DEN.

13. (a) Draw and explain the :

(i) Command and mode word formats of 8251. (7 marks)

(ii) Status word format of 8251. (8 marks)

Or

(b) Draw the functional pin diagram of 8279 and explain the function of different pins.

14. (a) Draw and explain the internal architecture of 8051 Microcontroller.

Or

(b) Draw and explain the internal architecture of ARM7 processor.

[4 × 15 = 60 marks]

D 92141 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 504—ELECTROMAGNETIC FIELD THEORY

(2014 Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. State and prove Gauss's theorem. Explain why it is called Divergence Theorem.
2. What is del operator ? Give its mathematical form. Explain its significance in EM field theory.
3. Derive an expression for energy stored in a magnetic field.
4. Give Maxwell's equations for static and time varying fields both in differential and integal form.
5. Explain the concept of wave polarization.
6. State and explain Poisson's equation.
7. State Poynting theorem and derive its Mathematical form.
8. Derive wave equations for conducting medium.
9. Explain how EM wave is propagated in an circular waveguide.
10. Give Mathematical expression for phase and group velocity and differentiate between them.

(8 × 5 = 40 marks)

Part B

Answer **four** *questions.*
Each question carries 15 *marks.*

11. Derive an expression for the electric field due to a straight and infinite uniformly charged wire of length L meters and with a charge density of ρ_L c/m at a point P which lies along the perpendicular bisector of wire.

Or

12. (a) Explain Poissons and Laplace's equations. 3.

    (b) A uniform line charge L = 25 N c/m lies on the x = 3 m. and y = 4 m. in free space. Find the electric field intensity at a point (2, 3, 15). m

Turn over

13. Starting with Maxwell's equations, derive inhomogeneous wave equations in terms of scalar potential ϕ and vector potential A.

Or

14. State and prove Poynting's Theorem.

15. Briefly explain about the wave incident :

    (i) Normally on perfect conductor. (7 marks)

    (ii) Obliquely to the surface of perfect conductor. (8 marks)

Or

16. (a) Explain the wave propagation in good dielectric with necessary equation. (7 marks)

    (b) Define depth of penetration. Derive its expression. (8 marks)

17. Explain single stub matching on a transmission line and derive the expression and the length of the stub used for matching on a line.

Or

18. Derive the expression for the input impedance of the dissipation less line and the expression for the input impedance of a quarter wave line. Also discuss the application of quarter wave line.

[4 × 15 = 60 marks]

D 92140 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 503—DIGITAL COMMUNICATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the need for sampling a signal.
2. What is line coding ? Explain the requirements of a line coder.
3. Write notes on adaptive delta modulation techniques.
4. Explain the need for scrambler and equaliser.
5. What is a matched filter ? Explain its working.
6. Explain a method to increase the SNR of a digital communication system in the presence of coloured noise.
7. Write notes on Gaussian Random process.
8. Derive the expression for power spectrum of an ASK signal.
9. Write notes on MSK system.
10. Derive the bit error probability expression of a coherent ASK system.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. Draw the block diagram of a digital communication system and explain the working of various sub-blocks.

Or

12. Derive the power spectral density expressions of on-off and Manchester signals. Comment on the expressions.

13. (a) Discuss, in detail the nyquist second criterion for zero ISI. (12 marks)

(b) Discuss the difference between Nyquist first and second criteria for zero ISI. (3 marks)

Or

Turn over

14. (a) Explain on eye diagram. (7 marks)

(b) Write notes on Gram Schmidt orthogonalisation procedure. (8 marks)

15. (a) Explain the logics of maximum likelihood detector and aposteriori probability detector. (6 marks)

(b) Explain a method of carrier synchronization. (9 marks)

Or

16. Explain any two methods of bit synchronization.

17. (a) Derive the expressions for the bit error probability of FSK, PSK systems. Comment on the expressions.

(b) Derive the expressions for the power density spectrum of FSK and PSK signals.

Or

18. (a) Derive the expression for the bit error probability of an Mary system. (10 marks)

(b) Compare the performance of binary and Mary modulation systems. (5 marks)

[4 × 15 = 60 marks]

D 92139 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 502—LINEAR INTEGRATED CIRCUITS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Draw the circuit of op-amp and list the five important ideal and practical characteristics of operational amplifier.
2. Explain the effect of open loop and close loop configuration on the output of an operational amplifier.
3. Design a first order low pass filter with a cut off frequency of 3 KHz. Draw the circuit and the frequency response of the filter.
4. Design a RC phase shift oscillator for a frequency of oscillator of 2 KHz. State the condition for oscillation of the circuit.
5. Design a square wave generator of period of 2 ms using 555 timer. Draw the circuit.
6. Find the resolution, LSB and maximum output voltage of an 8 bit DAC having output voltage range of 0 to 10 V.
7. Explain about phase detector circuit in PLL.
8. Differentiate between lock range and capture range of PLL.
9. Explain about techniques used to reduce bias current and offset voltage in an op-amp 741.
10. Explain the working of counter type of ADC.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Describe in detail about the various modules present in operational amplifier.

Or

(b) Explain how op-amp can be used as instrumentation amplifier and Schmitt trigger circuits.

12. (a) (i) Explain the working of op-amp as a ramp generator circuit. (7 marks)

(ii) Discuss the design of Narrow band pass filter and wide band reject filter. (8 marks)

Or

(b) Discuss about realization of filters using switched capacitor concept and operation of monostable circuit.

13. (a) Explain the working of flash type DAC and 7805 as adjustable regulator.

Or

(b) How 555 timer can be used to generate a delay of T duration ? Discuss the working of LM723 regulator.

14. (a) How PLL can be as AM detector, frequency translator and phase shifter ?

Or

(b) Discuss the operation of voltage controlled oscillator and PLL.

[4 × 15 = 60 marks]

D 92138 **(Pages : 2)** **Name.....**

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2014 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC 14 501—COMPUTER ORGANIZATION AND ARCHITECTURE

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*
Each question carries 5 *marks.*

1. Briefly explain the features of various generations of computers.
2. What is SPEC rating ? Explain.
3. Design a 3-bit carry lock-ahead adder.
4. Explain the memory write operation.
5. What is an execution cycle ? Explain.
6. Explain static and dynamic memories.
7. Explain Flash memory.
8. What is Associative mapping ?
9. Draw the equivalent circuit for an open-drain bus used to implement a common interrupt-request line.
10. What are vectored interrupts ? Explain.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

11. (a) Describe the various building blocks of a computer with block diagram.

Or

(b) Discuss the various addressing modes with suitable examples.

12. (a) Explain the microinstruction formats in detail.

Or

(b) (i) Explain the single bus organization of the datapath inside a processor. (7 marks)

(ii) Explain the sequence of operations in fetching a word from memory. (8 marks)

Turn over

Or

13. (a) (i) Explain Direct mapping and Set Associative mapping. (8 marks)

(ii) How Virtual Memory address translation is performed ? Explain. (7 marks)

Or

(b) Discuss in detail about the following secondary storage devices :

(i) Floppy disks. (3 marks)

(ii) Raid Disk array. (4 marks)

(iii) CD Rom. (4 marks)

(iv) DVD. (4 marks)

14. (a) (i) Explain the features of CISC and RISC architectures. (7 marks)

(ii) What is an Exception ? Explain. (8 marks)

Or

(b) (i) Explain Daisy chain priority scheme. (7 marks)

(ii) Explain the concept of program-controlled I/O. (8 marks)

[4 × 15 = 60 marks]

D 92131 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Automobile Engineering

AM 09 506—CASTING AND JOINING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the basic features and requirements of a good gating system ?
2. What is a cupola ? What does a cupola charge consist of ?
3. What do you understand by casting defect ?
4. Discuss the advantages of AC arc welding over DC arc welding.
5. What are the main advantages of epoxy adhesives ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain in detail the crucible furnace with neat sketches.
7. What do you understand by gating system ? What are the basic features and requirements of a good gating system ?
8. Compare in detail, TIG welding and MIG welding and state the applications for both the processes.
9. List the two types of radiant energy welding processes and explain any one in detail with neat sketches.
10. List the types of solid state welding processes and write short notes on any two of your choice.
11. In detail, explain some of the important adhesives used by industry.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. In detail, explain the different types of gates. Discuss them with neat sketches, also point out their merits and demerits.

Or

13. Explain in detail, the term pattern allowances; also discuss the various pattern allowances and their importance.

14. Explain in detail with neat sketches, the expanded polystyrene casting process, also mention its application and state the limitations of this process.

Or

15. Discuss in detail, with neat sketches :

    (i) Centrifugal Casting.

    (ii) Squeeze Casting.

16. Compare in detail, AC & DC arc welding processes, also list the various PPE used in a welding station and their importance.

Or

17. In detail, explain with neat sketches :

    (i) Projection Welding.

    (ii) Resistance Spot Welding.

18. In detail, explain some of the important adhesives used by industry.

Or

19. In detail, explain the following brazing processes with neat sketches :

    (i) Torch Brazing.

    (ii) Furnace Brazing.

(4 × 10 = 40 marks)

D 92130–A (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

B.Tech.

AM 09 502—AUTOMOTIVE TRANSMISSION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. List any *four* types of dutches.
2. What are the functions of a gear box ?
3. What is the effect of using an anti-drag baffle and a reservoir in the same vehicle.
4. A petrol engine develops 10 Nm. torque at maximum BHP speed of 4000 r.p.m. Determine the diameter of the impeller required to transmit the torque for a slip of 3 %.
5. State the limitations of electrical drives.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Explain the construction and working of a multi-coil spring single plate clutch.
7. Explain the advantages of gear ratios following a geomantic series.
8. Sketch and explain the functions of an anti-drag baffle.
9. Explain variable displacement pump and variable displacement motor type hydrostatic system with torque/speed and power/speed characteristics.
10. Give the advantages and limitations of hydrostatic drives.
11. Explain the phenomenon of electrical braking in electric drives.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. Explain dry and wet multi-plate clutch in detail.

Or

13. Derive the relation for torque capacity of a single plate clutch.

14. Sketch and explain the construction and working of a sliding mesh gear box with three forward gears and a reverse gear.

Or

15. Explain construction and working of a synchromesh gear box.

16. Explain the slip *Vs* impeller speed, efficiency *Vs* speed ratio and full speed starting torque *Vs* slip characteristics of a fluid coupling.

Or

17. Explain open type one way and closed type reversible hydrostatic transmissions with circuits.

18. Explain Chevrolet Turboglide Transmission with a sketch.

Or

19. Explain the methods of speed control in electrical drives.

(4 × 10 = 40 marks)

D 92130 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Information Technology Engineering

IT 09 503—EMBEDDED SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. When do we need an RTOS ?
2. Compare Harvard and Princeton memory organizations.
3. Mention the advantages of using finite state machines model.
4. When is interrupt activated in an embedded system ?
5. List the characteristics of Linux.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Describe the working of any *one* application that uses an embedded system.
7. Explain the processor selection factors.
8. Differentiate between Functions, Interrupt Service Routines and Tasks with an example.
9. Explain the common memory devices used and its purpose.
10. Explain the features of Mucos RTOS.
11. How is synchronization achieved in RTOS ? Give an example.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (A) Explain about the architecture of an embedded system.

Or

(B) Explain the working of any one real time application using an embedded system in detail.

13. (A) Explain the principle of operation involved in Direct Memory Access (DMA) in detail.

Or

(B) Compare the working principles of the various buses used in an embedded system highlighting each one's advantages and disadvantages.

14. (A) Explain the working of device drivers in detail. Also explain about deadline and interrupt latency.

Or

(B) Explain the working of Petrinet models for any real time application.

15. (A) Explain the RTOS structure and also explain about the schedule management for multiple tasks.

Or

(B) Explain the interrupt routine used in an RTOS environment with appropriate examples.

(4 × 10 = 40 marks)

D 92129 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT/PTCS 09 506—THEORY OF COMPUTATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Prove using mathematical induction that for all $n \geq 1$,

   $1 + 4 + 7 + \ldots + (3n - 2) = n\,(3n - 1)/2$.

2. Consider the CFG with productions S → aSbScS | aScSbS | bSaScS | bScSaS | cSaSbS | cSbSaS | λ. Does this generate the language L = {x belongs to $(a, b, c)^*$ | $n_a(x) = n_b(x) = n_c(x)$} ? Prove.

3. Define Recursive and Recursively Enumerable languages.

4. Find whether the lists M = (abb, aa, aaa) and N = (bba, aaa, aa) have a Post Correspondence Solution?

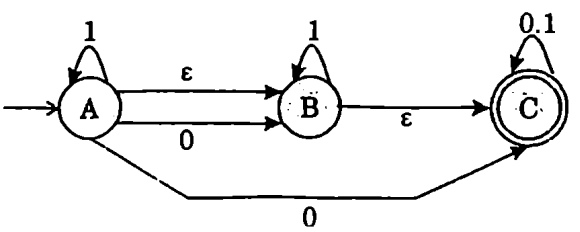
5. Describe Polynomial time reducibility.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Consider the NFA with ∈ move. Convert it to DFA.



7. Check whether the following grammar is ambiguous or not.

   Set of alphabets Σ = {0,... ,9, +, *, (,)}

   $E \rightarrow I$

   $E \rightarrow E + E$

   $E \rightarrow E * E$

   $E \rightarrow (E)$

   $I \rightarrow \varepsilon \mid 0 \mid 1 \mid \ldots \mid 9.$

8. Design a non-deterministic PDA for accepting the language $L = \{a^m b^{2m+1} \mid m \geq 1\}$, or $L = \{a^m b b^{2m} \mid m \geq 1\}$.

9. Prove post correspondence problem is Undecidable. Give example.

10. Discuss the power of variants of Turing machine models. Illustrate the different models with their configurations.

11. Brief about the problems that are solvable in polynomial space.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Consider the regular expression (0 + 1)* (10) defined over Σ = {0, 1}. Draw an NFA for the above regular expression and convert it into Minimized DFA.

Or

13. Construct DFA equivalent to the NFA. M = ({A, B, C, D}, {0, 1}, δ, A, {B, D}) where δ is defined as :

A	0	1
→ A	{B, D}	{B}
*B	{C}	(B, C)
C	{D}	{A}
*D	–	{A}

14. Construct Push down Automata that recognizes the Balanced Parentheses defined over $\Sigma = \{[,], \{,\}, (,)\}$. Trace the strings [{ ( ) }] and ({) }.

Or

15. Show the CYK Algorithm with the following CNF grammar (G) and check whether the string baaba in L(G).

$S \rightarrow AB \mid BC$

$A \rightarrow BA \mid a$

$B \rightarrow CC \mid b$

$C \rightarrow AB \mid a.$

16. Design Turing machine which can compute 2's Complement of given binary string.

Or

17. Design Turing machine which accepts an input #w#, where w is a string of a's and b's, the machine makes a copy of w and halts with #w#w#. Trace for string #abb#.

18. Explain and prove 3SAT is NP Complete.

Or

19. Define Reduction principle in terms of problem solving. How it is related to NP-Completeness and NP-Hardness of a problem ? Prove Directed Hamiltonian Path is NP Complete.

(4 × 10 = 40 marks)

D 92128 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT/PTCS 09 505—DIGITAL DATA COMMUNICATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Distinguish between a low-pass channel and a band-pass channel.
2. What is a carrier signal ? What is its role in data transmission ?
3. Differentiate error detection and correction.
4. What are the three major components of a telephone network ?
5. Define Framing.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What is multiplexing ? Explain FDM with a neat diagram.
7. Compare and contrast PCM and DM.
8. What are the different types of errors ? Explain.
9. Compare and contrast a circuit-switched network and a packet-switched network.
10. Distinguish between HDLC and PPP.
11. Explain point-to-point frame format.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. List various impairments and explain how they affect information carrying capacity of a communication link ?

Or

13. Explain the structure of fibre-optic cable with a neat diagram. What are the advantages of fibre-optic cable over Twisted pair and Coaxial cables ?

Turn over

14. Explain Pulse Code Modulation technique for analog-to-digital conversion with a neat block diagram.

Or

15. Explain the different techniques for converting digital data to analog signals. Give the sample wave forms for each technique.

16. Explain the datagram approach for packet switching network with suitable diagram.

Or

17. Explain the structure of a switch used in a packet-switched network with a suitable diagram.

18. Explain the FSM model for stop-and-wait protocol with a state diagram.

Or

19. Explain flow control and error control in detail.

(4 × 10 = 40 marks)

D 92127 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT/PTCS 09 504—OPERATING SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Process.
2. What is inter-process communication ?
3. Why is dynamic relocation performed ?
4. State the reason behind buffering.
5. Define Authorization.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write short notes on controllers.
7. Give a brief account of mutual exclusion and how is it achieved.
8. Enumerate on the different ways to prevent deadlock.
9. Explain paging with segmentation process.
10. Write short notes on typical implementation of paging.
11. Give short notes on Linked allocation.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain the design factors for operating system.

Or

13. Describe processes and threads.

14. Given the set of processes, their arrival time and execution time. Calculate the average waiting time for FCFS and pre-emptive SJF.

Process Id	Burst Time (ms)	Arrival Time (ms)
P1	8	0
P2	6	2
P3	1	1
P4	3	2

Or

15. Describe Banker's algorithm.

16. Calculate the number of page faults using FCFS and optimal page replacement algorithms for the page reference stream : 0 2 1 6 4 0 1 0 3 1 2 1. Assume a frame size of 3.

Or

17. Detail the process of paging.

18. Describe free space management.

Or

19. Explicate Memory Mapped IO.

(4 × 10 = 40 marks)

D 92126 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/PTCS 09 503—SIGNAL PROCESSING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. What is meant by deterministic signal and non-deterministic signal ?
2. Define Linear Time Invariant (LTI) System.
3. State Parseval's Theorem for CT Fourier Series.
4. What is convolution in DTFT ?
5. What is meant by Region of Convergence of a Laplace transform ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Find whether the following signals are periodic or not :

   i) $x(t) = 2\cos(10t+1) - \sin(4t-1)$.

   ii) $x(t) = 3\cos 4t + 2\sin t$.

7. Explain the classification of signals with examples.
8. Highlight the relation between Laplace transform and Fourier transform.
9. Define sampling theorem and mention its application with an example.
10. Determine the Nyquist sampling rate and Nyquist sampling interval for the signal, $x(t) = \text{sinc}^2(200t)$.
11. Find the z-transform and ROC of the causal sequence. X(n) = {1, 0, 3, –1, 2}.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *the following questions.*
Each question carries 10 *marks.*

12. A) Draw and explain the following sequences :
    I) Unit sample sequence
    II) Unit ramp sequence
    III) Real exponential sequence
    IV) Unit step sequence, and
    V) Sinusoidal sequence.

Or

B) Determine whether the system $y(t) = x(n^2)$ is : i) Linear ; ii) Time-invariant ; iii) Memoryless ; iv) Causal ; and v) Stable.

13. A) List the properties of continuous time Fourier series and explain them.

Or

B) Find the convolution of two signals x(n) ={ 1, 1,0, 1, 1} and h(n) = { 1,-2, -3, 4} and represent them graphically

14. A) State & prove the following properties of DTFT : i) Convolution property ; ii) Frequency differentiation.

Or

B) Find the Laplace transform of $f(t) = \sin at \cos bt$ and $f(t) = t \sin at$.

15. A) Find Inverse Z-transform of the following using partial fraction expansion method. $X(z) = \left(1 + 2z^{-1} + z^{-2}\right) / \left(1 - 1.5z^{-1} + 0.5z^{-2}\right)$.

Or

B) State and prove the following properties of z transform : i) Time shifting ; ii) Time reversal ; iii) Differentiation ; and iv) Scaling in z-domain.

(4 × 10 = 40 marks)

D 92125 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT/PTCS 09 502—INDUSTRIAL ECONOMICS AND PRINCIPLES OF MANAGEMENT

Time : Three Hours Maximum : 70 Marks

Section A (Industrial Economics)

PART A

Answer **all** *questions.*

I. (a) Depict an example for Perfect competition. (1 mark)

(b) State the law of diminishing marginal utility. (2 marks)

(c) What is meant by deflation ? (2 marks)

PART B

Answer any **two** *questions.*

II. 1 Explain the concept of division of labour and its historical stages of evolution.

2 Discuss in detail about the significance of Consumption in Industrial Economics with suitable example.

3 Explain Balance of Trade (BOT) with appropriate example relating to Industrial Economics.

(2 × 5 = 10 marks)

PART C

Answer **all** *questions.*

III. (a) Discuss in detail about the three stages of capital formation.

Or

(b) Explain in detail about Market price. Enumerate about the effect of income levels on market price.

IV. (a) Compare and contrast co-operative sector and state enterprises.

Or

(b) Discuss in detail about GNP. Also, explain the difference between GNP and GDP.

(2 × 10 = 20 marks)

Turn over

Section B (Principles of Management)

Part A

Answer **all** *questions.*

I. (a) What is meant by responsibility ? (2 marks)

(b) Define Cost. (2 marks)

(c) What is PERT ? (1 mark)

Part B

Answer any **two** *questions.*

II. (1) Explain the seven steps involved in decision making.

(2) Explain in detail about marketing mix.

(3) Explain about the process involved in the allocation of overheads.

(2 × 5 = 10 marks)

Part C

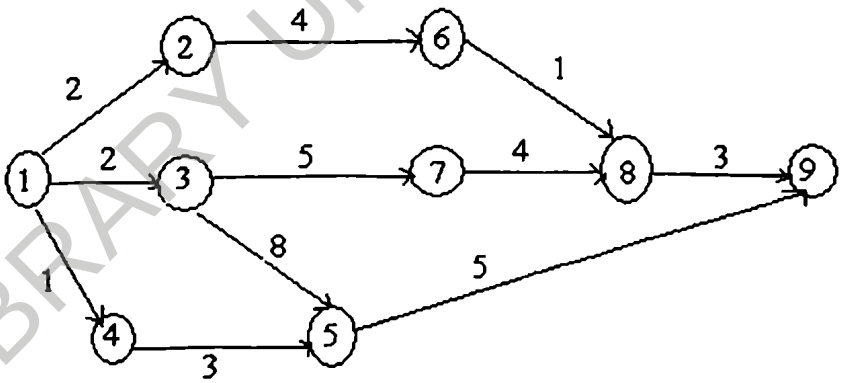
Answer **all** *questions.*

III. (a) Discuss the contribution of Henry Fayol Management.

Or

(b) Explain the concept of decision tree with suitable example.

IV. (a) Find the critical path and calculate the slack time for the following network.



Or

(b) Explain in detail about any six advantages and six limitations of Break even analysis.

(2 × 10 = 20 marks)

D 92124 **(Pages : 2)** **Name**.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Computer Science and Engineering

CS/IT/PTCS 09 501—SOFTWARE ARCHITECTURE AND PROJECT MANAGEMENT

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State the software lifecycle.
2. Define literate modelling.
3. Give the patterns for organization of work.
4. Define Layering.
5. State the need for offline concurrency patterns.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write short notes on allocation view type.
7. Discuss the benefits of advanced imaging solutions.
8. Explain access control pattern.
9. Differentiate framework and patterns.
10. How is messaging achieved in EAI ?
11. Give a brief account on web presentation patterns.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. A) Discuss the code view software architecture in detail.

Or

B) Discuss in detail about building the documentation package.

Turn over

13. A) Explain archetypes and archetype patterns.

Or

B) Elucidate on product archetype pattern and quantity archetype pattern.

14. A) State the significance of resource management and describe in detail about the pattern for resource management.

Or

B) Compare and contrast architectural and structural patterns.

15. A) Describe the different levels of EAI.

Or

B) Discuss the role of EAI in process automation.

(4 × 10 = 40 marks)

D 92123 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME/PTME 09 506—METAL CUTTING AND FORMING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define broaching.
2. Differentiate between single point and multipoint tools.
3. List the advantage and disadvantage of nano fabrication.
4. Define rolling.
5. Elucidate the difference between open and closed die forging.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. A 12 mm hole is drilled at a feed of 0.3 mm/rev in a 7 mm thick plate. The spindle is rotating at 900 r.p.m.—Calculate : (i) material removal rate ; and (ii) machining time.
7. Write short note on mechanism of chip formation.
8. Distinguish between laser beam machining and plasma arc machining.
9. Write the significance of forging forgebility in metal forming.
10. Discuss about the construction features of combination die.
11. Differentiate between explosive forming and electro hydraulic forming.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. What are the methods by which cutting forces can be measured during metal cutting ? Discuss in detail about any two methods of measuring cutting forces.

Or

13. Explain about the different factors which determine the selection of cutting tool material.

14. Discuss in detail about the parameters, power, torque and cutting forces involved in milling.

Or

15. Discuss in detail about the various processes that can be carried out with drilling machines.

16. Explain in detail about the electron beam machining process with a neat sketch. Also state its merits and demerits.

Or

17. Explain the process of abrasive jet machining with the respect to principle, equipment, process parameters and application.

18. Explain electromagnetic forming with a neat sketch.

Or

19. Explain with the help of neat sketch about different types of bending in detail.

(4 × 10 = 40 marks)

D 92122 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME/PTME/AM/ 09 505—MECHANICS OF MACHINERY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Transmission angle.
2. Define the term 'rubbing velocity'.
3. Define lift or stroke of a follower.
4. Specify any two effects of backlash in spur gears.
5. Differentiate number synthesis and type synthesis.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. List the inversions of a slider crank chain and brief on crank and slotted lever mechanism with simple sketch.
7. Explain Hooke's joint with simple sketch.
8. Draw the disc cam mechanism with roller follower and mark the parts.
9. What are non-standard gears ? Mention the nomenclature.
10. Write short notes on simple gear train. Also mention the use of intermediate gears.
11. Write the procedure for 2 position motion generation synthesis of a four bar mechanism using inversion method.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. The dimensions of a four bar mechanism are as follows, crank, O_2A = 30 mm, coupler, AB = 35 mm, rocker, O_4B = 35 mm and the frame O_2O_4 = 60 mm. Draw the extreme configurations and measure the transmission angle.

Or

13. For the position of the mechanism shown in Fig.1, find the velocity of the slider B for the given configuration, if the velocity of the slider A is 3 m/s.

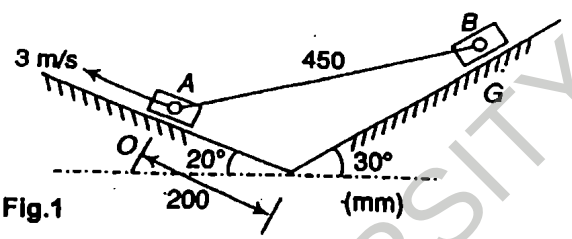


Fig.1

14. Draw the radial cam profile for a cam and follower mechanism, which will lift the roller follower to 50 mm. The diameter of the roller is 20 mm. The outstroke of the follower takes place with cycloidal motion during 100° of cam rotation, followed by a period of dwell during 30° of cam rotation. The follower then returns with cycloidal motion during 120° of cam rotation and again followed by a dwell during the further rotation of the cam. The minimum radius of cam is 50 mm. If the cam rotates at a uniform speed of 240 r.p.m., find the maximum velocity and the acceleration during outstroke.

Or

15. A cam has straight working faces which are tangential to a base circle of diameter 90 mm. The follower is a roller of diameter 45 mm and the centre of roller moves along a straight line passing through the centre line of the cam shaft. The angle between the tangential faces of the cam is 90° and the faces are joined by a nose circle of 10 mm radius. The speed of rotation of the cam is 120 r.p.m. Draw the cam and find the acceleration of the roller centre. If, during the lift, the roller is just about to leave the straight flank.

16. Two 20° involute spur gears mesh externally and give a velocity ratio of 3. The module is 3 mm and the addendum is equal to 1.1 modules. If the pinion rotates at 120 r.p.m., determine the minimum number of teeth on each wheel to avoid interference and the contact ratio.

Or

17. The annulus A in the gear shown in Fig.2, rotates at 240 r.p.m. about the axis of the fixed wheel S which has 80 teeth. The three armed spider is driven at 150 r.p.m. Determine the number of teeth required on wheel P.

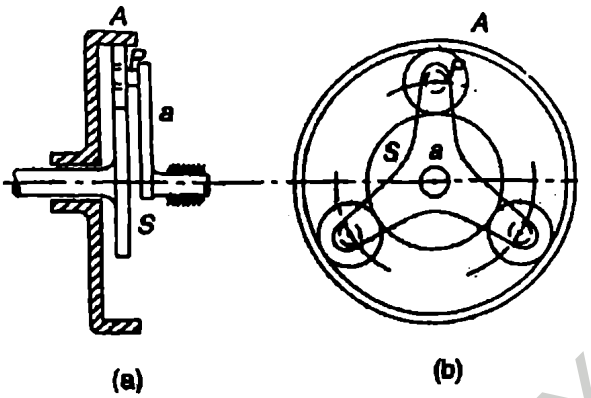


Fig.2

18. Synthesize a four bar mechanism whose coupler passes through the points $C_1(100,100)$, $C_2(120,110)$, $C_3(130,120)$.

Or

19. List the steps in three position function generation synthesis of a four bar mechanism using Freudenstien's equation.

(4 × 10 = 40 marks)

D 92121 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME/PTME/AM/09 504—I.C. ENGINES AND GAS TURBINES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Write difference between SI and CI Engine.
2. Write difference between open cycle and closed cycle gas Turbine.
3. What is Cetane number ?
4. Draw P-V diagram of duel combustion cycle.
5. What is the limiting factor in designing turbine blades ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Draw the ideal and actual valve timing diagram for a four-stroke diesel engine.
7. Explain the flue gas analysis using orsat apparatus.
8. Explain the mist lubrication system used in EC Engines.
9. Explain the flame propagation process in SI Engine.
10. What are the advantages of axial compressors than centrifugal compressor ?
11. Explain the heat balance test carried out in an IC Engine.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. An Engine 20 cm bore and 30 cm stroke works on ideal Otto cycle. The clearance volume is 1600 cm^3. The initial pressure and temperature are 1 bar and 60°C. If the maximum pressure is limited to 24 bar, find the following :

    (a) Air standard efficiency of the cycle.

    (b) Mean effective pressure for the cycle.

Or

13. Dry exhaust gas from oil engine had the following compositions by volume :

    CO_2 = 8.85 %, CO – 1.2 %, O_2 – 6.8 % and N_2 – 83.15 %. The fuel oil had a percentage composition by mass as C = 84 %, H_2 = 14 %, O_2 – 2 %. Determine (a) mass of carbon per kg of dry flue gas ; and (b) A/F ratio.

14. Explain magentoignition system with neat sketch.

Or

15. Explain the working of stratified charged engine with neat sketch.

16. Explain in detail about various combustion chambers used for SI Engines.

Or

17. What is diesel knock ? What are the effect of engine variables on diesel knock ?

18. What are the methods to increase the thermal efficiency of gas turbine power plants ?

Or

19. Explain in detail about the axial flow turbines ? Draw a neat sketch and explain the parts.

(4 × 10 = 40 marks)

D 92120 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME/PTME/AM/PT/MT 09 503—ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. Mention the various rate of return method.
2. Define opportunity cost.
3. Write down the definition of Engineering Economics.
4. Mention the Characteristics of Management.
5. What is a balance sheet and why is it prepared ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Define break-even point. Draw a break-even chart and explain its components.
2. Differentiate 'technical efficiency' and 'economical efficiency'.
3. What would be the future value of Rs. 100 invested in a fixed deposit for 5 years with an interested in a fixed deposit for 5 years with an interest rate of 15% compounded annually ?
4. List out the various types of management skills.
5. Write the comparison between formal and informal organization.
6. Mention the steps involved in project planning.

(4 × 5 = 20 marks)

Part C

Answer **all** *the questions.*
Each question carries 10 *marks.*

1. Suppose a 40-year old man is planning for his retirement. Heplans to retire at the age of 60 and estimates that he can live comfortably on Rs. 24,000 per year in terms of today's rupee value. He can invest his savings at 15% compounded annually. Assume an average inflation rate of 9% for the next 30 years.

Turn over

What equal amount should he save each year until he retires so that he can make withdrawals at the end of each year commencing from the end of the 21st year from now that will allow him to live as comfortably as he desires for 10years beyond his retirement ?

Or

2. Explain the various methods of Depreciation.

3. Explain about the Non-Discounted Cash Flow Criteria method of Pay Back Period (PBP) in detail.

Or

4. A person is planning for his retired life. He has 10 more years of service. He would like to deposit Rs. 8,500 at the end of the first year and thereafter he wishes to deposit the amount with an annual decrease of Rs. 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10th year of the above series.

5. Explain briefly about the functions of management.

Or

6. Explain about performance appraisal.

7. Briefly explain the evolution of Marketing.

Or

8. Explain the Critical Path Method (CPM) in Project management.

(4 × 10 = 40 marks)

D 92119 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME/PTME 09 502—ADVANCED MECHANICS OF SOLIDS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Define strain tensors.
2. Write short notes on Saint Venant's principle for end effects.
3. Write short notes on rotating discs.
4. What is bending moment ?
5. What is shear flow ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. The state of stress at a point is such that $\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yz} = \tau_{zx} = \rho$. Determine the principal stresses and their directions.
7. The state of stress at a point is characterized by the components $\sigma_x = 100$ MPa, $\sigma_y = -40$ MPa, $\tau_{xy} = \tau_{yz} = \tau_{zx} = 0$. Determine the extremum values of the shear stresses, their associated normal stresses, the octahedral shear stress and its associated normal stress.
8. Calculate the thickness of the shell of a bomb calorimeter of spherical form of 10 cm. inside diameter if the working stress is σ kgf/cm^2 (98 σ kPa) and the internal pressure is $\sigma/2$ kgf/cm^2 (49 σ kPa).
9. Derive the expression for tensile stress (σ_e) for cylinder subjected to internal pressure.

Turn over

10. Explain Castiglione's first theorem.

11. Write short notes on torsion of thin walled closed section.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. At a point P in a body, σ_x = 10,000 N/cm^2 (1020 kgf/cm^2), σ_y = – 5,000 N/cm^2 (– 510 kgf/cm^2), σ_z = – 5, 000 N/cm^2, $\tau_{xy} = \tau_{yz} = \tau_{xz}$ = 10,000 N/cm^2. Determine the normal and shearing stresses on a plane that is equally inclined to all the three axes.

Or

13. Explain the strain deviator and its invariants.

14. A flat steel turbine disk of 75 cm. outside diameter and 15 cm. inside diameter rotates at 3000 r.p.m, at which speed the blades and shrouding cause a tensile rim loading of 44 kgf/cm^2 (4312 kPa). The maximum stress at this speed is to be 1164 kgf/cm^2 (114072 kPa). Find the maximum shrinkage allowance on the diameter when the disk and the shift are rotating.

Or

15. A unsymmetrical one cell box beam with four corner flange members A, B, C and D as shown in Figure 1. Loads P_x and P_y are acting at a distance of 125 cm. from the section ABCD. Determine the stresses in the flange members A and D. Assume that the sheat-metal connecting the flange members does not carry any flexural loads.

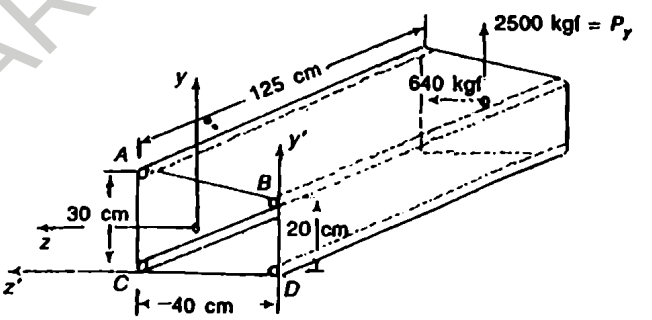


Figure 1

16. Explain the minimum potential energy theorem and complementary energy theorem.

Or

17. Explain the Maxwell reciprocal theorem.

18. A shaft having a cross-section of thin regular octagon with a longitudinal slit and stiffened by a vertical member of same thickness is subjected to a torque of 2500 Nm. If mean length of a side of the octagon is 100 mm, uniform thickness is 20 mm. and the vertical member as shown in Figure 2. Divides the section in two equal halves find : (a) The torque shared by each half ; (b) Maximum shear stress in each half ; and (c) Angle of twist per unit length . Given G = 80 GPa.

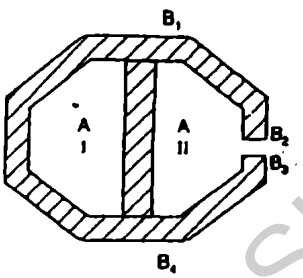


Figure 2

Or

19. If the slit in the shaft of section is welded is shown in Figure 3, find the torque resisting capacity of the shaft for the same angle of twist/unit length i.e. 42276×10^{-8} rad/metre. Also find the shear stresses in different branches.

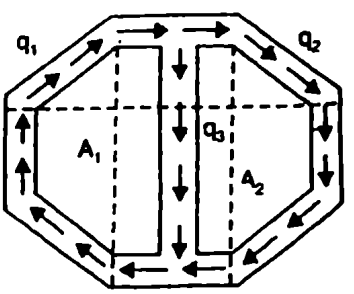


Figure 3

(4 × 10 = 40 marks)

D 92118 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Mechanical Engineering

ME/PTME/AM 09 501—HEAT AND MASS TRANSFER

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. State Newton's law of cooling.
2. Define thermal conductivity.
3. Differentiate between film boiling and pool boiling.
4. Define transmissivity in radiation.
5. Define fouling in heat exchanger.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Derive the equation for steady state one-dimensional heat conduction in a plane wall.
7. Brief on the effect of thermal conductivity of materials.
8. Explain the concept of boundary layer on a flat plate.
9. Brief on the concept of black body radiation.
10. Assuming the sun to be a black body emitting radiation with maximum intensity at $\lambda = 0.49 \mu m$, Calculate the surface temperature of the sun and the heat flux at surface of the sun.
11. Derive the expression for steady state diffusion of A through a non-diffusing B.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. A small electric heating application uses wire of 2 mm. diameter with 0.8 mm. thick insulation (k = 0.12 W/m.°C). The heat transfer coefficient (h_0) on the insulated surface is 35 W/m^{2}C. Determine the critical thickness of insulation in this case and the percentage change in the heat transfer rate if the critical thickness is used, assuming the temperature difference between the surface of the wire and the surrounding air remains unchanged.

Or

13. The walls of a house in a cold region consist of three layers - an outer brickwork of 15 cm. thickness and an inner wooden panel of 1.2 cm. thickness. The intermediate layer is made of an insulating material 7 cm. thick. The thermal conductivities of the brick and the wood used are 0.70 W/m°C and 0.18 W/m°C, respectively. The inside and outside temperatures of the composite wall are 21°C and – 15°C, respectively. If the layer of insulation offers twice the thermal resistance of the brick wall, Calculate the rate of heat loss per unit area of the wall and the thermal conductivity of the insulating material.

14. A vertical cylinder 1.5 m. high and 180 mm. in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume the properties of air at mean temperature as, ρ = 1.06 kg./m^3, υ = 18.97 × 10^{-6} m^2/s, C_p = 1.004 kJ/kg.°C and k = 0.1042 kJ/m.h.°C.

Or

15. Air at atmospheric pressure and 200°C flows over a plate with a velocity of 5 m/s the plate is 15 mm. wide and is maintained at a temperature of 120°C. Calculate the thickness of hydrodynamic and thermal boundary layers and the local heat transfer co-efficient at a distance of 0.5 m. from the leading edge. Assume that the flow is on one side of the plate.

ρ = 0.815 kg./m^3 μ = 24.5 × 10^{-6} Ns/m^2, Pr = 0.7, k = 0.0364 W/m.K.

16. Determine the radiant heat exchanger in W/m^2 between two large parallel steel plates of emissivities 0.8 and 0.5 held at a temperatures of 1000 K and 500 K respectively, if a thin copper plate of emissivity 0.1 is introduced as a radiation shield between the two plates. Use σ = 5.67 × 10^{-8} W/m^{2}K.

Or

17. Calculate the following for an industrial furnace in the form of a blackbody and emitting radiation at 2500°C : (i) Monochromatic emissive power at 1.2 μm length ; (ii) Wavelength at which the emission is maximum ; (iii) Maximum emissive power ; and (iv) Total emissive power and total emissive power of the furnace if it is assumed as a real surface with emissivity equal to 0.9.

18. A spherical cylinder 3.5 m. inner diameter, 40 mm thick, made of nickel, contains gas at 358 K. Molar concentration of hydrogen in Ni at the inner surface is 0.085 kg mole/m^3 and is zero at the outer surface. Determine the mass diffusion rate of hydrogen through the walls of the container.

Or

19. Nitrogen gas diffuses through a 12 mm. layer of non-diffusing gaseous mixture containing C_2H_4 = 20 %, C_2H_6 = 10 %, C_4H_{10} = 70 %, under steady state condition. The operating temperature and pressure of the system are 25°C and 1 atm respectively and at this condition the partial pressure of the nitrogen at two planes are 0.15 bar and 0.08 bar respectively. The diffusivity of nitrogen through C_2H_4, C_2H_6 and C_4H_{10} are 16×10^{-6} and 14×10^{-6} and 9×10^{-6} m^2/s respectively. Determine the diffusion rate of nitrogen across the two planes.

(4 × 10 = 40 marks)

D 92117 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Production Engineering

PE 09 502—COMPUTATIONAL METHODS IN ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What are the types of errors in numerical analysis ?
2. State Newton's formula for interpolation.
3. What is the difference between Trapezoidal rule and Simpson's rule ?
4. What is the difference between Euler's method and a Taylor series ?
5. State the finite differences scheme of $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

(5 × 2 = 10 marks)

Part B

Answer any **four** *out of six.*

6. Find the positive root of $f(x) = x^3 - 2x + 5$ by False position method.
7. Solve by Gauss Elemination method : $3x + 4y + 5z = 18, 2x - y + 8z = 13, 5x - 2y + 7z = 20$.
8. Use Lagrange's formula of interpolation find y (1) given :

x	–1	0	2	3
y	–8	3	1	12

9. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's rule.

10. Using Taylor's series method, find y at $x = 0.1$ given $\frac{dy}{dx} = x^2 - y, y(0) = 1$ correct to four decimal places.

11. Solve $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial t} = 0, 0 < x < 4, t > 0$ given $U(0,t) = 0, u(4,t) = 0, u(x,0) = x(4-x)$. Assume $h = 1$. Find the values of u upto $t = 4$ by Schmidt method.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

12. (a) Find all the roots of the equation $4x - e^x = 0$ that lies between 2 and 3 by Newton's method.

Or

(b) Solve $x^3 - x^2 - x = 2$ using Graeffe's method.

13. (a) Use relaxation method to solve the system :

$8x + y + z + w = 14, 2x + 10y + 3z + w = -8, x - 2y - 20z + 3w = 111, 3x + 2y + 2z + 19w = 53.$

Or

(b) Solve Gauss - Seidel method, the following system :

$28x + 4y - z = 32, x + 3y + 10z = 24, 2x + 17y + 4z = 35.$

14. (a) Use Gaussian three point and three point formula and evaluate $\int_0^1 \left(3x^2 + 5x^4\right) dx$. Also compare with exact values.

Or

(b) Given $\frac{dy}{dx} = \frac{1}{2}\left(1 + x^2\right)y^2$, and $y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21$, evaluate $y(0.4)$ by Milne's predictor corrector method.

15. (a) Solve $\nabla^2 u = -10\left(x^2 + y^2 + 10\right)$ over the square mesh with sides $x = 0, y = 0, x = 3, y = 3$ with $u = 0$ on the boundary and mesh length 1 unit.

Or

(b) Solve numerically, $u_{tt} = u_n$ upto $t = 0.5$ with spacing of 0.1 given the boundary conditions $u(0,t) = 0, u(1,t) = 0$ and the initial conditions $u_t(x,0) = 0$ and $u(x,0) = 10 + x(1-x)$ (taking $h = k = 0.1$ $a = 1$).

(4 × 10 = 40 marks)

D 92114 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 506—TRANSDUCERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

1. How to classify the transducers based on conversion principle ?
2. Enlist the nine forms of energy domains in transducer classification.
3. List the special features of Magnetostrictive transducers.
4. Draw the schematic of devices used for torque measurement.
5. Draw the schematic of glass membrane electrode.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Describe the features of contact-free potentiometer.
7. Enumerate the advantages of Foil type strain gauges over wire gauges.
8. List the desirable features of capacitive transducer.
9. Count and produce the applications of velocity measurement.
10. Explain why accelerometers are preferred over displacement and velocity sensors.
11. Discuss the different causes of viscometer errors.

(4 × 5 = 20 marks)

Turn over

Part C

Answer Section (a) **or** (b) *questions.*

Each question carries 10 *marks.*

12. (a) Explain the working principle of Thermistor with illustrations.

Or

(b) Describe the significance of Bonded type strain gauge.

13. (a) Describe how pressure can be sensed using the capsules.

Or

(b) Explain the concept in pressure measurement using Differential capacitor pickups.

14. (a) Describe the operation of piezoresistive accelerometers.

Or

(b) Explain the principle and operation of Magnetoresistive Force transducers.

15. (a) Describe the operation of cone and plate viscometer with illustrations.

Or

(b) Describe the working of strain-gauge accelerometers.

(4 × 10 = 40 marks)

D 92113 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09505—POWER ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define fast recovery diodes.
2. Write the different types and application of cycloconverters.
3. Draw the circuit diagram of a 1Φ AC voltage controller.
4. What is an isolation amplifier ?
5. State the types of drive circuits for power semiconductor devices.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Draw the turn on characteristics of SCR and mark the timings t_d, t_r and t_p.
7. Compare Power MOSFET and IGBT.
8. A resistive load of 10 Ω is connected through a half wave SCR circuit to 220 V, 50Hz, Single phase source. Calculate the power delivered to the load for firing angle of 60°. Find also the value of input power factor.
9. Compare voltage source inverter with current source inverter.
10. Explain the function of boost regulators with suitable diagram.
11. Discuss the function of type D chopper.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. Explain the structure, operation and static characteristics of SCR with neat diagrams.

Or

13. With a diagram explain thyristor voltage and current waveforms during turn-on and turn-off process.

14. For the single phase fully controlled bridge is connected to RLE load. The source voltage is 230 V,50 Hz. The average load current of 10A continuous over the working range. For R = 0.4 Ω and L = 2mH, Compute

    (a) firing angle for E = 120V

    (b) firing angle for E =-120V.

Or

15. Describe the working of a single phase cycloconverter with its circuit and waveform.

16. Explain the working principle of a two quadrant type B chopper with its waveform.

Or

17. With a circuit and waveform discuss the working of McMurray Bedford inverter.

18. Describe the principle and working with a diagram of multistage conversion.

Or

19. Draw and explain the schematic diagram of synchronization circuits.

(4 × 10 = 40 marks)

D 92112 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 504—COMPUTER ORGANIZATION AND ARCHITECTURE

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Differentiate between CISC and RISC.
2. Draw the structure of byte and word addressing.
3. Define miss penalty.
4. Mention the significance of SPARC architecture.
5. Define array pipelining.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. How the performance of the computer can be measured ? Explain.
7. Write short notes on microprogrammed control.
8. Discuss in detail about cache memories.
9. Explain in detail about multiple execution units.
10. Write short notes on on-line storage devices.
11. Differentiate between parallelism and pipelining.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. a) Explain in detail about instruction and instruction sequencing.

Or

b) i) Define subroutine. Explain with an example. (6 marks)

ii) Explain how the word fetched and stored from and to the memory. (4 marks)

Turn over

13. a) i) Discuss in detail about Direct Memory Access. (8 marks)

ii) Differentiate between synchronous and asynchronous DRAMs. (2 marks)

Or

b) Explain in detail about the booth algorithm.

14. a) Explain the influence of pipelining on instruction set design.

Or

b) Explain the operation of video displays, flat panel displays and printers.

15. a) Explain in detail about architectural classification schemes.

Or

b) Explain the principles for designing pipelined processors.

[4 × 10 = 40 marks]

D 92111 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. [ENGINEERING] DEGREE (2009 SCHEME) EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 503—CONTROL ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Comment on negative feedback.
2. Define Settling time.
3. Explain the significance of steady state error.
4. Enlist the frequency domain specifications.
5. Differentiate transfer function and state space.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

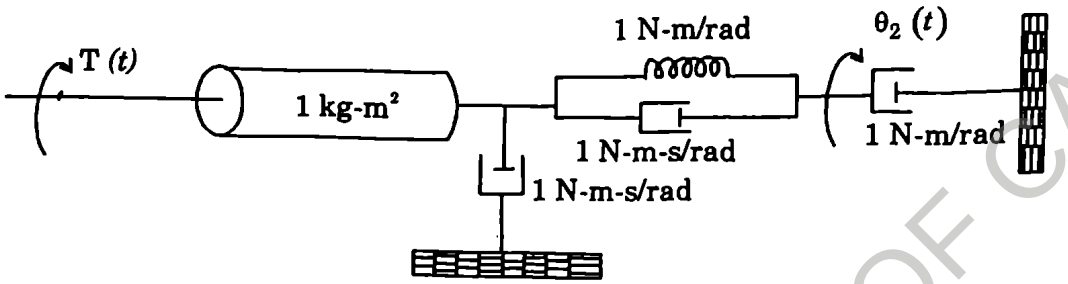
6. Discuss the differences of open and closed loop control system.
7. Discuss the basic elements of Force-Current analogous electrical systems.
8. Discuss the Angle of departure in root loci.
9. Differentiate underdamped and critically damped second order systems.
10. Correlate the time and frequency domain specifications.
11. Describe Bush or companion form.

(4 × 5 = 20 marks)

Part C

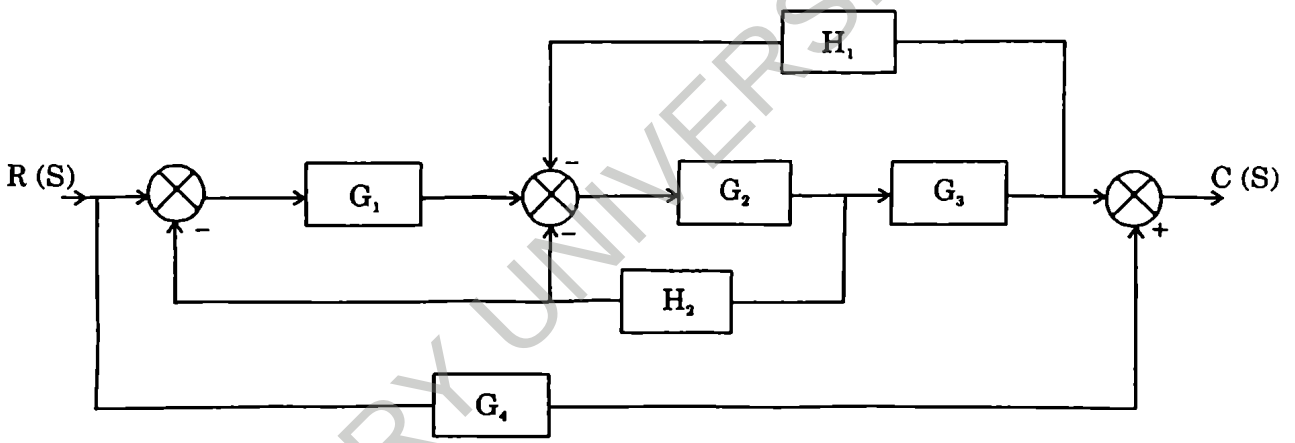
Answer Section (a) or Section (b) of each question.

12. (a) Obtain the transfer function $\theta_2(t)/T(S)$ for the Translational Mechanical Model.



Or

(b) Obtain the transfer function using Block diagram reduction and verify using Signal Flow graph.



13. (a) Derive an expression for the time response of critically damped second order systems with unit step Input.

Or

(b) Sketch the root locus and find the value of K for

$$G(s) = \frac{K}{s(s+2)\left(s^2+2s+4\right)}.$$

14. (a) Determine the Gain and Phase margins for the open loop transfer function

$$G(s)H(s) = \frac{100}{s(s+1)(s+5)}$$ using Bode plot.

Or

(b) Derive to show that magnitude and phase of a transfer function can be expressed as circles.

15. (a) Consider the system below and obtain the transfer function.

$$\dot{X} = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -2 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$Y = \begin{bmatrix} -1 & 3 & 3 \end{bmatrix} X.$$

Or

(b) Find the state transition matrix for system matrix given below using Cayley-Hamilton theorem

$$A = \begin{bmatrix} 0 & 1 \\ -4 & -4 \end{bmatrix}.$$

(4 × 10 = 40 marks)

D 92110 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 502—SIGNAL AND SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Continuous-time signal.
2. What is meant by Time reversal of a signal ?
3. Define Linearity property of Fourier transform.
4. Show the symmetry property of DTFT.
5. Find the Z-transform of the unit-impulse signal.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. How are time-dependent signals classified ?
7. Describe and draw the block diagrams of the basic signal operations.
8. Explain Duality property of Fourier transform.
9. Explain how time shifting is done using DTFT.
10. Derive a suitable Laplace transform for a ramp function.
11. Find the Z-transform of the signal defined as

(4 × 5 = 20 marks)

Turn over

Part C

Answer Section (a) **or** *(b) questions.*
Each question carries 10 *marks*

12. (a) Elaborate the characteristics of a continuous-time system.

Or

(b) Discuss the Invertibility property of LTI systems.

13. (a) Discuss the differences of convolution in time and frequency domain in view from fourier transform.

Or

(b) Explain Parseval's Theorem and the Energy Transfer function of Fourier transform.

14. (a) Find the response, using the DTFT, of the system governed by the difference equation :

$$Y(n) = x(n) + 0.6y(n-1) \text{ to the input } x(n) = \cos\left(\frac{2\pi}{6}n + \frac{\pi}{6}\right)$$

Or

(b) Find $L\left\{t^n e^{-at} u_o(t)\right\}$

15. (a) Describe the characterization of a system by its poles and zeros.

Or

(b) Explain unilateral Z-transform with relevant equations.

(4 × 10 = 40 marks)

D 92109 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Applied Electronics and Instrumentation Engineering

AI 09 501—ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Tabulate the Minimum mode signals of 8086 with their functions and types.
2. Explain the instruction XCHG BX, CX.
3. Differentiate HOLD and HLDA of 80386.
4. Explain the Mnemonic SWAP A.
5. Enlist the Arithmetic flags of 8051.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Discuss Based Indexed with Displacement Addressing mode of 8086.
7. For the conditional assembly processs how the : (a) forms used for the IF statement and ; (b) relational operators used with WHILE and REPEAT in 8086.
8. Explain the significance of segment descriptor registers of 80386.
9. Show the Instruction affecting flags of 8051.
10. Double the number in register R2 and put the result in register R3 (high byte) and R4 (low byte).
11. Set Timer T0 to an initial setting of 1234h.

(4 × 5 = 20 marks)

Turn over

Part C

Answer Section (a) **Or** *(b) Questions.*
Each question carries 10 *marks.*

12. (a) Describe how memory is organized for 8086.

Or

(b) Describe and distinguish between macro and procedure of 8086.

13. (a) Describe in detail the protected mode of 80386.

Or

(b) Explain the Paging Descriptor Base register of 80386 in detail.

14. (a) Describe the unsigned and signed addition instructions of 8051.

Or

(b) Explain the Jump and Call Program Range of 8051.

15. (a) Place any number in internal RAM location 3Ch and increment it until the number equals 2Ah using atleast three different methods.

Or

(b) Find the address of the first two internal RAM locations between 20h and 60h which contain consecutive numbers. If so, set the carry flag to 1, else clear the flag.

(4 × 10 = 40 marks)

D 92108 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE/PTEE 09 506—ELECTRICAL MATERIAL SCIENCE

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

I. 1 List the materials used for lamp filaments.

2 Mention the polarization mechanisms in dielectrics.

3 What is meant by polarization of a material ?

4 Give the general properties of insulating materials.

5 What is nuclear magnetic resonance ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

II. 1 Explain how electrical conductivity varies with temperature and composition ?

2 Describe the purification process of semiconductor materials.

3 Explain one main feature of Ferro electricity ?

4 Illustrate the factors influencing dielectric strength of capacitor materials ?

5 Explain the importance of solar selective coatings ?

6 Distinguish between hard and soft magnetic materials ?

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

III. 1 Write notes on amorphous and organic semiconductors.

Or

2 Explain about the magnetic materials used in electrical machines and instruments.

3 Derive an expressions for electronic, ionic and dipolar polarizations in polyatomic gases.

Or

4 Explain the following : (i) Dipolar relaxation ; and (ii) Dielectric loss.

5 Describe the breakdown mechanisms in gases and liquids.

Or

6 Discuss the electrical, mechanical and thermal properties of insulating materials.

7 Distinguish between Cold mirror coatings and Heat mirror coatings used for enhanced solar thermal energy collection.

Or

8 What is magnetic resonance ? Describe about nuclear magnetic resonance and Electron spin resonance.

(4 × 10 = 40 marks)

D 92107 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE/PTEE 09 505—DIGITAL SYSTEM DESIGN

Time : Three Hours Maximum : 70 Marks

Part A

I. Answer *all* questions. Each question carries 2 marks :

1 Write the functionalities of compiler and synthesizer.

2 Write any two features of VHDL.

3 What is a structured logic device description ?

4 Differentiate feedback sequential circuits from clocked synchronous state machine.

5 What is a stable total state ?

(5 × 2 = 10 marks)

Part B

II. Answer any *four* questions. Each question carries 5 marks :

6 Write a VHDL entity that combines generic and generate statements to define a "bus inverter" with a user-specifiable width.

7 Write a VHDL program for prime detector architecture using a case statement.

8 Explain different ways to obtain logic symbols for an AND and an OR gate.

9 Describe functional behavior of D latch for various inputs.

10 Explain state minimization with an example.

11 Obtain hazards free excitation equation for D-latch.

(4 × 5 = 20 marks)

Part C

III. Answer *all* questions. Each question carries 10 marks :

12 Explain the usage of functions and procedures in VHDL program.

Or

13 What is a test bench ? Write a VHDL test bench using asset and report.

Turn over

14 Explain different rules in drawing schematic for HDL design projects.

Or

15 Describe an active high 3 to 8 decoder and develop a VHDL structural program for a 2 to 4 decoder.

16 Explain master slave J-K flip flop with timing diagram.

Or

17 Design a clocked synchronous state machine with two inputs, X and Y, and one output, Z. The output should be 1 if the number of 1 inputs on X and Y since reset is a multiple of 4, and 0 otherwise.

18 Analyze the feedback circuit of a D latch with appropriate sketch.

Or

19 Obtain and explain flow and reduced flow table of a positive edge triggered D flip flop.

(4 × 10 = 40 marks)

D 92106 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE/PTEE 09 504—POWER ELECTRONICS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

I. 1 List the advantages of GTO over SCR.

2 Illustrate the need of snubber circuit.

3 List the some of the application of converters.

4 What is meant by 'current limit control' of a chopper ?

5 Give the expression for RMS and average output voltage of single phase half wave a.c. voltage controller.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

II. 1 Distinguish between SCR and TRIAC.

2 With a neat diagram explain how the snubber circuit protects the MOSFET.

3 Examine the effect of source impedance on the performance of converter.

4 Explain the control strategies for chopper circuit.

5 Illustrate Why thyristors are not preferred for Inverter ?

6 Differentiate phase control and sequence control of voltage controller.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

III. 1 Explain and draw steady state and switching characteristics of SCR.

Or

2 Examine the basic structure of IGBT and Explain its working. Give its equivalent circuit and explain the turn ON and turn OFF processes.

3 Explain the operation of a single phase full converter with RL load using relevant waveforms. Obtain the expressions for its average output voltage and RMS value of output voltage.

Or

4 Describe in detail, the various types of PWM methods available for voltage control employed in an inverter.

5 Explain the different classes of chopper with neat sketch.

Or

6 Describe the operating principle of single phase to single phase cycloconverter with continuous and discontinuous load current with circuit and waveform.

7 With a neat power circuit diagram, explain the operation of boost converter. Draw the load voltage and load current waveforms and derive the expression for the output voltage.

Or

8 Draw and explain the block schematic of SMPS and mention its advantages over linear power supply.

(4 × 10 = 40 marks)

D 92105 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE/PTEE 09 503—LINEAR CONTROL SYSTEMS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

I. 1 Write Masons gain formula.

2 Define order of a system.

3 Write the necessary and sufficient condition for stability.

4 Explain, why frequency domain analysis is needed ?

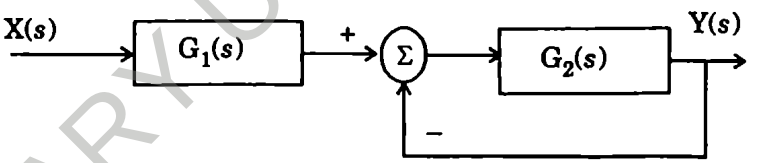
5 Predict the need for compensators.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

II. 1 Evaluate the transfer function of the network given.



2 Give the reason for preferring negative feedback control system.

3 Analyze the response of first-order system with unit step input.

4 What type of input should be applied to the below transfer function to get a constant steady stat error ? Solve for its value.

$$G(s) = \frac{20(s+2)}{(s+1)(s+3)}.$$

Turn over

5 Examine dominant pole location in s-plane and its significance.

6 Explain in detail about PID controllers used in control systems.

(4 × 5 = 20 marks)

Part C

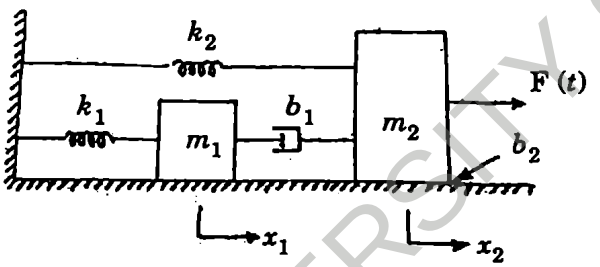
Answer **all** *questions.*

Each question carries 10 *marks.*

III. 1 For the mechanical system shown in figure,

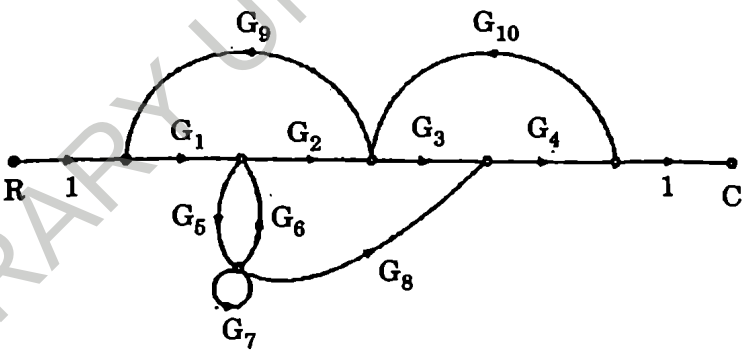
(i) Write the differential equations describing the behavior of the system.

(ii) Draw the force-voltage and force-current analogous electrical circuits.



Or

2 A system is represented by signal flow graph shown in figure, obtain the overall gain of the system using Mason's gain formula.



3 The unity feedback system characterized by open loop transfer function

$$G(s) = \frac{K}{s(s+10)}.$$

Evaluate the gain K such that damping ratio will be 0.5 and find time domain specifications for a unit step input.

Or

4 Construct R-H array and determine the stability of a system representing the characteristic equation comment on location of the roots of the characteristics equation

$9s^5 - 20s^4 + 10s^3 - s^2 - 9s - 10 = 0.$

5 Sketch the Bode Magnitude plot for the transfer function

$$G(s) = \frac{Ks^2}{s(1+0.2s)(1+0.02s)}.$$

Hence find 'K' such that gain cross over frequency is 5 rad/sec.

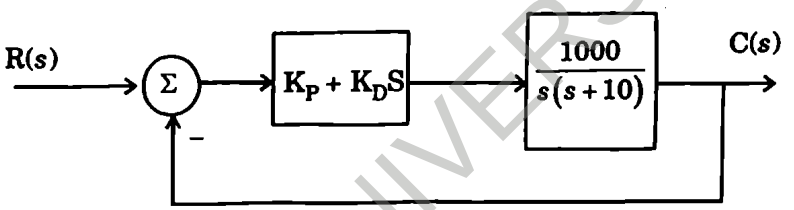
Or

6 A unity feedback control system has

$$G(s) = \frac{15}{(s+1)(s+3)(s+6)}.$$

Draw the Bode plot.

7 A unity feedback system with a PD controller as shown in figure. Determine the values of KP and KD so that the steady state error to a unit ramp input is 0.001 and damping ratio is 0.5.



Or

8 Write down the procedure for designing Lag-Lead compensator using Bode plot.

(4 × 10 = 40 marks)

D 92104 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE/PTEE 09 502—ELECTRICAL POWER GENERATION, TRANSMISSION AND DISTRIBUTION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Define Diversity factor.
2. Write ABCD constants of medium T network.
3. What are the main requirements of the insulating materials used for cable.
4. Define transmission efficiency.
5. List the advantages of using bundled conductor.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

1. Write short notes on MHD power generation.
2. What is sag template ? Explain how this is useful for location of towers and stringing of power conductors.
3. Examine the factors which affecting corona.
4. A single core cable, 1.7 km long, has a conductor radius of 13mm and insulation thickness of 5.8mm. The dielectric has a relative permittivity of 2.8.Calculate the capacitance per meter length of cable.
5. Point out the reasons for line loss in transmission line.
6. Discuss how inductance and capacitance of transmission line are affected by the spacing between the conductors.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

1. Draw a layout for a hydro electric power plant and explain the functions of each components of that plant.

Or

2. Discuss and compare varioustariff used in practice.

3. An OHL at a river crossingis supported from two towers of heights 30m and 90m above water level with the span of 300m. The weight of the conductors is 1 kg/m and working tension is 2000kg. Determine the clearance between the conductor and water level midway between the towers.

Or

4. Discuss how string efficiency is improved by capacitance grading suspension insulators

5. A D.C ring main distributoris fed at A and the load is tapped at points B, C, D. The distributor length is 400m long and points B, C, D are 150m, 250m, 375m from A. Loads are 150A, 40A, 200A respectively. If resistance /100m of single conductor is 0.04 Ω and VA = 220V. Calculate : (i) Current in each distributor, (ii) voltage at points B, C, D.

Or

6. A single core cable for 66kV, 3phase system as a conductor of 2cm diameter and sheath of inside diameter 5.3cm. It is required to have two inter sheaths so that the stress varies between the same maximum and minimum values in the three layers of dielectric. Find the positions of inter sheaths, maximum and minimum stress and voltages on the inter sheaths. Also find the maximum and minimum stress if the inter sheath are not used.

7. Derive from first principle the capacitance per km to neutral of three phases overhead transmission line with unsymmetrical spacing of conductors assuming transposition.

Or

8. A 50Hz, 3 phase transmission line 30km long has a total series impedance of (40 + j 125) and shunt admittance of 10-3 mho. The load is 50MW at 220kV with 0.8pf lag. Find the sending end voltage, current, power factor, efficiency and regulation using nominal π - method

(4 × 10 = 40 marks)

D 92103 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electrical and Electronics Engineering

EE/PTEE 09 501—SYNCHRONOUS AND INDUCTION MACHINES

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

I. 1 What is synchronizing power of an alternator ?

2 List the inherent disadvantages of synchronous motor.

3 List the merits and demerits of double squirrel cage induction motors.

4 Point out the two advantages of speed control of induction motor by injecting an e.m.f. in the rotor circuit.

5 Describe how the direction of a capacitor run motor can be reversed.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

II. 1 Distinguish between transient and sub-transient reactances.

2 Two reaction theory is applied only to salient pole machines. State the reason.

3 Explain in detail the method of starting of synchronous motor.

4 Point out the effect of variation of rotor resistance and rotor reactance on maximum torque, efficiency and power factor of an induction motor.

5 Discuss the advantages of slip power scheme. And also mention the types.

6 Discuss the applications of linear induction motor.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

III. 1. Define the terms synchronous reactance and voltage regulation of alternator. Explain synchronous impedance method for determining regulation of an alternator.

Or

2. Predict the full load voltage regulation of a 3-phase star-connected, 1000 kVA, 11,000V alternator has rated current of 52.5A. The ac resistance of the winding per phase is 0.45 Ω. The test results are given below : OC Test : field current = 12.5A, voltage between lines = 422V SC Test : field current = 12.5A, line current = 52.5A

   (a) For 0.8 pf lagging and (b) 0.8 pf leading.

3. Examine in detail the effect of varying excitation on armature current and power factor of synchronous motor.

Or

4. Deduce the expression for power delivered by a synchronous motor in terms of load angle.

5. Discuss the different power stages of an induction motor with losses.

Or

6. The test readings of a 3 phase 14.71 kW, 400 V, 50Hz, star connected induction motor is given below: No load test: 400 V, 9 A, $Cos\ \phi = 0.2$.

   Short Circuit Test: 200 V, 50 A, $Cos\ \phi = 0.4$.

   From the Circle Diagram estimate: (i) Line current (ii) Power Factor (iii) Slip (iv) Efficiency at full load. Also evaluate the maximum power output.

7. Illustrate the rotor rheostat control of 3 phase slip ring induction motor.

Or

8. Illustrate the operation of single phase induction motor with double field revolving theory.

(4 × 10 = 40 marks)

D 92102

Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE 09 507—CIVIL ENGINEERING DRAWING—II

Time : Three Hours

Maximum : 50 Marks

Part A

Answer any **two** *questions.*

Each question carries 10 *marks.*

1. Draw the plan of a single storied residential building having three bedrooms, two bathrooms a car park and a porch on a land measuring 13 m. × 15.5 m. with sufficient space to move around the building.
2. Design a luxurious office with 9 seats, a small kitchen/cafeteria, reception, board room space for personal assistants and a garden cum dining area.
3. Design and detail a soak pit for 25 users and an absorption area of 59.35 m^2.

(2 × 10 = 20 marks)

Part B

Answer the question.

It carries 30 *marks.*

4. Design the electrical, plumbing and sanitary services required for a single storied building with three bed rooms, a kitchen, a dining hall, a living room, a foyer, etc.

(1 × 30 = 30 marks)

D 92101 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE/PTCE 09 506—BUILDING TECHNOLOGY—II

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the advantages of framed structures ?
2. What is fire load ? How is it determined ?
3. What are the advantages of thermal insulation ?
4. Discuss any two causes for foundation failure.
5. Differentiate the terms Illuminance and Luminance.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Explain the requirements of formworks used in concrete structures.
2. What are the different types of elevators ?
3. What is the grading of buildings according to fire resistance ?
4. What are the different ways of heat transfer ?
5. What is the principle of filler slab construction ?
6. What is the purpose of traps in a drainage system ?

(4 × 5 = 20 marks)

Part C

Answer all *questions.*
Each question carries 10 *marks.*

1. Compare concrete and steel framed structures.

Or

2. Explain the design criteria for elevators in tall buildings.

Turn over

3. Discuss the general fire safety requirements for buildings.

Or

4. Compare the different systems of plumbing.

5. Discuss the different forms of thermal insulating materials.

Or

6. Discuss the various noise control measures.

7. What are the major reasons for failures in RCC structure ?

Or

8. Discuss the different seismic strengthening measures for masonry structures.

(4 × 10 = 40 marks)

D 92100 (Pages : 4) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE/PTCE 09 505—STRUCTURAL ANALYSIS—II

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. Why is it necessary to compute deflections in structures ?
2. What are the advantages of continuous beam over simply supported beam ?
3. How do you account for sway in slope deflection method for portal frames ?
4. What are the assumptions are made in the approximate analysis of portal frames the lateral load analysis of multi-storied structures ?
5. State the kinematic theorem of plastic collapse.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Define distribution factor with a neat diagram. Write also its equations.
7. Explain in detail about symmetrical frames with a neat diagram and equations.
8. State the application of Clapeyron's theorem for fixed beam with a neat diagram.
9. Explain the procedure of Kani's method in detail.
10. Explain in detail about kinematic method for analysis of beams.
11. What are the assumptions made in plastic theory ? Explain in detail.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) A Continuous beam ABCD 20 m long is simply supported at its ends and is propped at the same level at B and C as shown in Figure 1 :

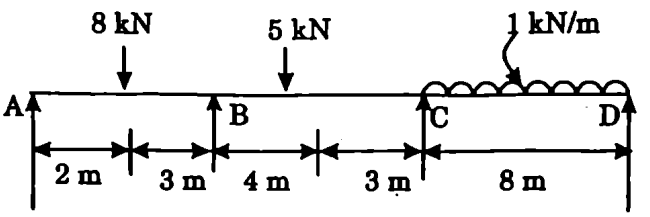


Figure 1

Or

(b) Analyze the structure in Figure 2 by the slope deflection method and sketch the bending moment and shear force diagram.

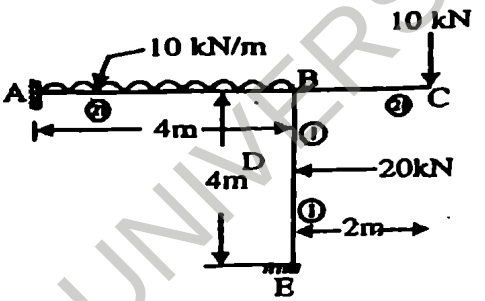


Figure 2

13. (a) Analyze the portal frame as shown in Figure 3 by Kani's method. Draw the Bending Moment Diagram and sketch the deflected shape of the frame. Take EI as constant for all the members.

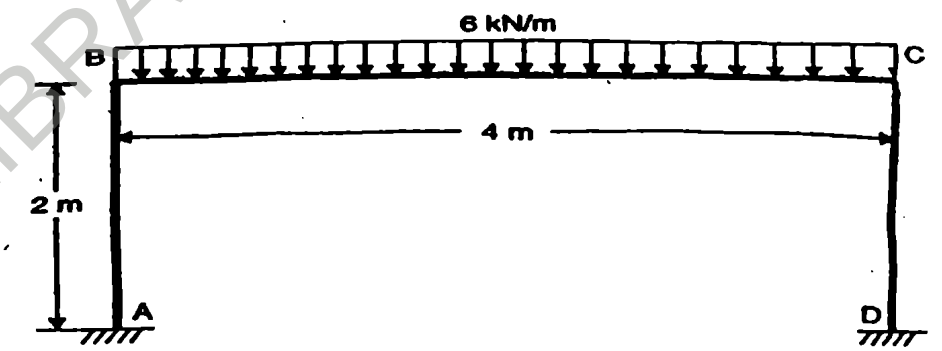


Figure 3

Or

(b) Analyze the continuous beam shown in Figure 4 by the three moment equation. Draw the shear force and bending moment diagram.

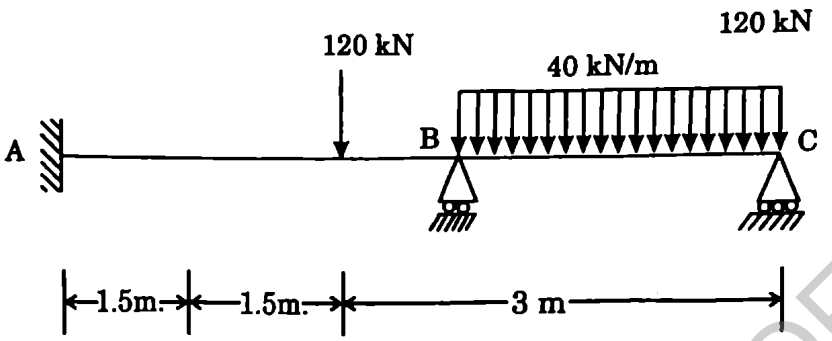


Figure 4

14. (a) Analyse the building frame shown in Figure 5 for vertical loads using approximate methods.

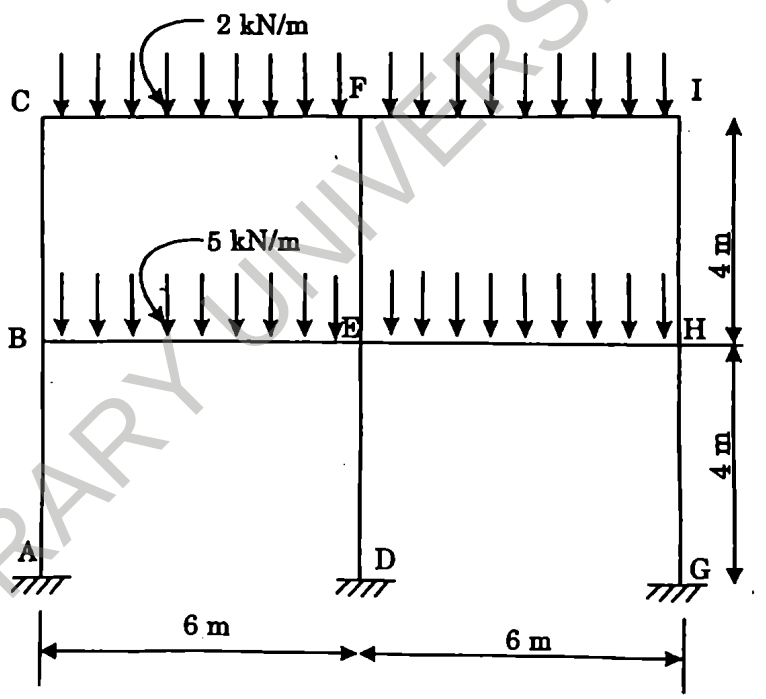


Figure 5

Or

(b) A quarter circle beam of radius R curved in plan is fixed at end A and free at end B as shown in Figure 6. It carries a vertical load P at its free end. Determine the deflection at free end and sketch the shear force, bending moment and torsional moment diagram. Assume Flexural rigidity (EI) = Torsional rigidity (GJ).

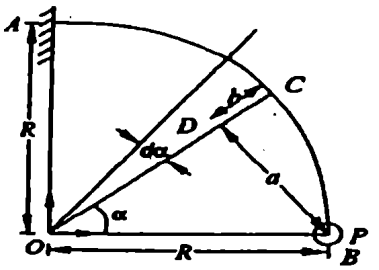
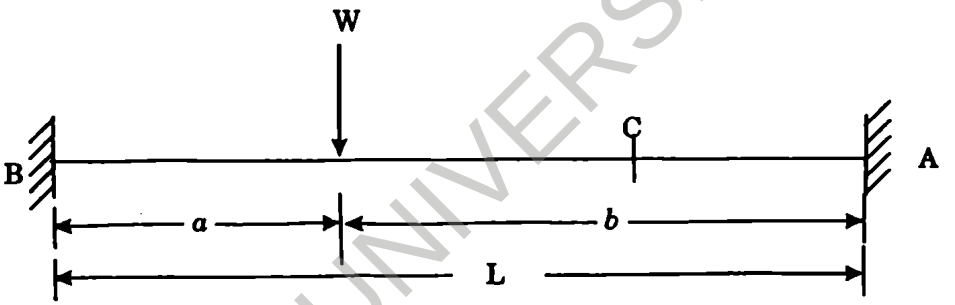


Figure 6

15. (a) (i) Show that in a propped cantilever subject to a moving concentrated load the worst position is at 0.414 L from end and its load carrying capacity is $W_c = 5.828\ (M_p/L)$.

(5 marks)

(ii) Determine the collapse load in case of a fixed beam as shown in Figure 7.



(5 marks)

Figure 7

Or

(b) Determine the plastic moment capacity of the frame for the loading as given in Figure 8. Assume same section is used throughout.

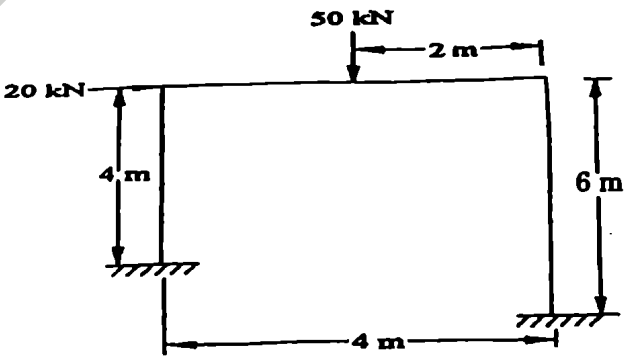


Figure 8

(4 × 10 = 40 marks)

D 92099 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE/PTCE 09 504—GEOTECHNICAL ENGINEERING–I

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Alluvial soil and give an example.
2. Define Plasticity Index.
3. State Darcy's law.
4. Define primary consolidation.
5. Provide a practical example for earth pressure at rest.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the determination of filed density with core cutter method with a rough figure.
7. Draw the plasticity chart and mark the relevant soil types.
8. Draw a typical Mohr circle and mark failure plane and failure envelope for Direct shear test.
9. What are the factors influencing compaction ?
10. Briefly explain the use of proctor needle.
11. Explain the term critical height, in case of a vertical cut.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 15 *marks.*

12. In its natural condition, a soil sample has a mass of 2300 g and a volume of 1.2×10^{-3} m^3. After being completely dried in an oven, the mass of the sample is 2000 g. The value of G_s for the soil is 2.67. Determine the bulk density, bulk unit weight, water content, dry unit weight, void ratio, porosity, degree of saturation, air content and percentage air voids. ($\gamma w = 9.81$ kN/m^3)

Or

13. Find the % Finer, coefficient of curvature and comment about the type of soil.

Sieve size	4.75 mm	2.36 mm	1.18 mm	600 micron	425 micron	300 micron	150 micron	75 micron	pan
Soil weight retained (kg) :	0.09	0.3	0.81	0.6	0.03	0.06	0.21	0.6	0.3

14. In a falling head test on a sample 12.2 cm high and 44.41 cm^2 in cross-section, the water level in a standpipe of 6.25 mm internal diameter dropped from a height of 75 cm to 24.7 cm in 15 minutes. Find the coefficient of permeability. If the same test was conducted in a constant head permeability test with the same sample size, and if the quantity of water collected was same to that of the falling head test in fifteen minutes, What will be the head kept in the test ?

Or

15. A cylindrical soil sample was subjected to axial principal effective stresses (σ'_1) and radial principal effective stresses (σ'_3). The soil could not support additional stresses when $\sigma'_1 = 450$ kPa and $\sigma'_3 = 150$ kPa. (1) Determine the friction angle and the inclination of the slip plane to the horizontal. (2) Determine the stresses on the failure plane. (3) Determine the maximum shear stress. (4) Is the maximum shear stress equal to the failure shear stress ? (Assume no significant dilatational effects, and failure envelope passing through the origin).

16. An 8 m thick clay layer with single drainage settles by 120 mm in two years. The coefficient of consolidation for this clay was found to be 6×10^{-3} cm^2/s. Calculate the likely ultimate consolidation settlement and find how long it will take to undergo 90% of this settlement.

Or

17. Write the procedure of heavy compaction test (IS2720 Part VIII) and draw a sample compaction curve showing the results of both standard and heavy compaction test.

18. Plot the distribution of active pressure on the wall surface shown in Figure 1. Calculate the total thrust on the wall (active + hydrostatic) and determine its point of application. Assume $\delta = 0$ and $C_w = 0$.

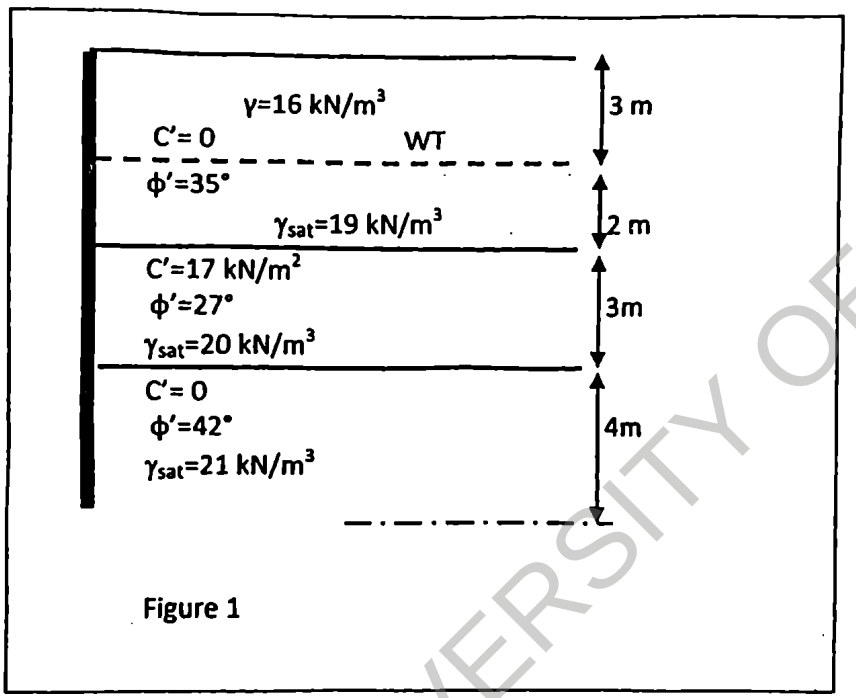


Figure 1

Or

19. Draw the schematic diagrams of Toe failure, base failure, slip failure and explain the procedure of Friction circle method in slope stability analysis.

(4 × 10 = 40 marks)

D 92098 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE/PTCE 09 503—OPEN CHANNEL HYDRAULICS AND HYDRAULIC MACHINERY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. What is the difference between uniform flow and non-uniform flow ?
2. What are the basic assumptions made for deriving dynamic equation for gradually varied flow ?
3. Define hydraulic jump. Write any *two* practical applications.
4. Differentiate between impulse and reaction turbine.
5. What is meant by most economical section of open channels ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Prove that for a most economical rectangular channel the hydraulic radius is half the depth of flow.
7. Sketch the water surface profiles that occur in a critical slope channel.
8. Explain the different types of hydraulic jump in a horizontal channel.
9. Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of jet.

Turn over

10. Explain about priming of centrifugal pump.

11. Write a short note on stilling basins.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. A trapezoidal channel with side slopes of 2 horizontal : 1 vertical has to be designed to carry 15 m^3/s at a slope of 1/5000. Determine the dimensions of the efficient section. Manning's co-efficient is 0.014.

Or

13. Find at what bed slope a 4 m. wide rectangular channel be laid so that the flow is critical at a normal depth of 1.25 m. Take Minning's co-efficient, n = 0.015.

14. A rectangular channel 7.5 m. wide has uniform depth of flow of 2.0 m. and has a bed slope of 1 in 3000.1f due to weir constructed at the downstream end of the channel, water surface at a section is raised by 0.75 m., determine the water surface slope with respect to horizontal at this section. Assume Manning's n = 0.02.

Or

15. Explain different methods to measure the velocity of flow through open channels.

16. (a) Explain the characteristics of rapidly varying flow. (3 marks)

(b) A sluice gate discharges water into horizontal rectangular channel with a velocity of 10 m/s and depth of flow 1 m. Determine the sequent depth of the hydraulic jump and consequent loss in total head.

(7 marks)

Or

17. A rectangular channel carrying a super-critical flow is to be provided with a hydraulic jump type of energy dissipater. Energy loss required in the hydraulic jump is 6m and inlet Froude number is 10. Determine : (i) Sequent depth ; and (ii) Froude number after the jump.

18. A Pelton wheel has a mean bucket speed of 12m/s and is supplied with water at a rate of 750 litres per second under a head of 35 m. If the bucket deflects the jet through an angle of 160°, find the power developed by the turbine and its hydraulic efficiency. Take the co-efficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80 %.

Or

19. The impeller of a centrifugal pump is 300 mm outside diameter and 150 mm inside diameter. The impeller vane angles are 30° and 25° at the inner and outer peripheries respectively. The speed of the pump is 1450 r.p.m. The velocity of flow through impeller is constant. Find the work done by the impeller per unit weight of water.

[4 × 10 = 40 marks]

D 92097 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE/PTCE 09 502—STRUCTURAL DESIGN–I

Time : Three Hours Maximum : 70 Marks

Use of IS 456 : 2000 is permitted.
Any missing data may be suitably assumed.

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define partial safety factor.
2. What is meant by development length ?
3. Give any two situations where doubly reinforced sections are preferred.
4. Differentiate between one way slab and two-way slab.
5. Define slenderness ratio.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. What are the various design philosophies for RCC structures ?
2. Determine the area of tension reinforcement required for a rectangular beam with 250mm width and 317mm effective depth, to be designed as a balanced section. M20 concrete and Fe415 steel are used.
3. A reinforced concrete beam has an effective depth of 40cm. At a particular section, it has 8mm diameter, two legged stirrups provided at 20cm centre to centre. Calculate the shear resistance of the stirrups. Use M20 concrete and Fe 415 steel.
4. Explain the structural classification of staircases.
5. Explain the function of torsional reinforcement at the corner of a slab
6. A rectangular column of section 300 × 500mm is reinforced with 8 bars of 25mm & determine the load carrying capacity of column taking min. eccentricity less than 0.05 times lateral dimensions. Use M20 and Fe 415 grade steel.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

MODULE 1

1. Calculate the maximum stresses in concrete and steel for a concrete beam having width of 400mm and effective depth 550mm reinforced with 4# 20mm dia. bars, and carries a load of 70kN. Use m = 19. Clear cover is 40mm. Beam has a span of 4m.

Or

2. Determine moment of resistance and the area of tensile steel required for a reinforced concrete beam of width 300mm and effective depth 550mm. Use M 15 concrete and Fe 415 steel.

MODULE 2

3. Design a rectangular RC beam simply supported on supports of 230mm width. The clear span of beam is 6m. The beam is to have a width of 300mm and carries a superimposed load of 12kN/m. Use M25 concrete and Fe415 steel.

Or

4. A reinforced concrete T section has an effective width of flange as 1500mm, thickness of flange 125mm, overall depth 500mm, breadth of rib 250mm. It is provided with 4#20mm dia. bars, at an effective cover of 50mm. Find the moment of resistance of the beam if M15 concrete and Fe 415 steel are used.

MODULE 3

5. Design and detail a slab of size 3m × 6.2m for a living room of a residential building. Take floor finish as 1.5kN/m. Use M20 concrete and Fe 415 steel.

Or

6. Design a RCC slab for a room 6.3m × 4.5m to be cast monolithically over the beams with all sides simply supported. It has to carry a characteristic load of 10kN/m^2 in addition to the self-weight. Use M25 concrete and Fe415 grade steel.

MODULE 4

7. Design and detail a dog legged stair for floor-to-floor height of 3.2m and stair case dimension of 2.5 × 4.75m. Use M20 concrete and Fe 415 steel. Assume live load and floor finish as 3kN/m^2 and 1.25kN/m^2 respectively.

Or

8. Design the reinforcement in a column of size 450 × 600mm subjected to an axial load of 2000kN. The column has an unsupported length of 3m and is braced against sidesway in both directions. Use M20 concrete and Fe 415 grade steel.

(4 × 10 = 40 marks)

D 92096 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Civil Engineering

CE/PTCE 09 501—TRANSPORTATION ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Camber.
2. What is origin destination survey ?
3. What do you mean by index properties of soil ?
4. What are the factors affecting the size of an apron ?
5. What is the significance of marker beacon ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Illustrate typical cross-sections of roads.
7. What is the different classification of roads by Nagpur Road Plan and explain the methods employed for the classification ?
8. Describe the significance of equivalent single wheel load in the design of pavements.
9. Differentiate between summit curves and valley curves.
10. Define PCU and what are the factors affecting PCU values.
11. List the conditions on which basic runway length is calculated.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

12. (a) The speed of overtaking and overtaken vehicles are 70 and 50 kmph on a two-way traffic road. If the acceleration of overtaking vehicle is 0.98 m/sec^2. Calculate the safe overtaking sight distance and the minimum length required for overtaking zone.

    (b) Explain various stages of engineering surveys for the Highway location.

Or

13. (a) What is Lag Distance ?

    (b) Explain the significance of sight distance in the highway geometric design.

14. (a) Compare Nagpur Road Plan and Bombay Road Plan.

    (b) Explain with neat sketches the collision diagrams and condition diagrams.

Or

15. A fixed time 2 phase signal is to be provided at an instersection having a North-South and a East-West road where only straight ahead traffic is permitted. The design hour flows from the various arms and the saturation flows for these arms are given below :

	North	South	East	West
Design hour flow (q) in PCU /hour	800	300	700	1000
Saturation flow (s) in PCU/hour	2200	2000	3000	3000

Calculate the optimum cycle time and green times for the minimum overall delay. Assume the value of amber period is 2 seconds and the time lost per phase due to starting delays as 2 seconds. Also sketch the timing diagram for each phase.

16. (a) List the tests used for the evaluation of strength of sub-grade soil.

    (b) Illustrate with the help of figure CBR test for subgrade soil.

Or

17. Explain IRC recommendations for the design of Concrete Pavements.

18. Describe in detail the factors affecting the site selection of Airport.

Or

19. List out the characteristics of Aircraft and explain how it influences the Airport Planning.

(4 × 10 = 40 marks)

D 92095 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC/PTEC 09 506—LINEAR INTEGRATED CIRCUITS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Define Input bias current.
2. What is the significance of level shifting stage in an operational amplifier circuit ?
3. Sketch the ideal characteristics of low-pass and band pass filters.
4. Define conversion time of an ADC.
5. What do you mean by free running frequency in PLL ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Explain the measurement of output resistance in an op-amp.
2. Draw the circuit of op-amp Schmitt trigger and explain the hysteresis characteristics.
3. Explain the characteristics of sallen-key LPF.
4. How is current boosting performed in 723 regulator ?
5. Explain the principle of operation of weighted resistor DAC.
6. Define the terms :

   (i) Lock range ; and (ii) Capture range.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries **10** *marks.*

1. Explain the operation of a emitter coupled differential amplifier supplied by a constant current source.

Or

2. Draw the detailed internal diagram of op-amp and explain each block with simplified circuit diagram.

3. (i) Briefly explain the frequency response of a RC filter from its transfer function.

   (ii) Derive an expression for bandwidth.

Or

4. Design a second order band-pass filter with a mid-band voltage gain of 40, corner frequency 160 Hz and a 3 db bandwidth B = 14 Hz.

5. Explain the operation of integrator circuit and obtain an expression for its output voltage.

Or

6. Explain the operation of dual slope ADC with neat sketches.

7. Draw the internal block diagram of 565 PLL IC and explain the working of each block. Explain the capture range and lock range of PLL and show them in a band spectrum.

Or

8. Explain the operation of VCO.

(4 × 10 = 40 marks)

D 92094 **(Pages : 2)** **Name**.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC/PTEC 09 505—MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the signals involved in memory bank selection in 8086 ?
2. What do you mean by pipelining in 8086 ?
3. Define PPI.
4. How high power devices are interfaces with microprocessor ports ?
5. What is key bounce ? How it is achieved ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. List the features of 8051 microcontroller.
7. What are the functions of OBF in 8255 ?
8. Discuss the multiprocessor configurations of 8086.
9. Discuss the addressing modes of 8051.
10. What are the different operating modes of 8257 DMA controller ?
11. What are the functions of bus interface unit (BIU) in 8086 ?

(4 × 5 = 20 marks)

Turn over

Part C

Answer **one** *question from each module.*
Each question carries 10 *marks.*

Module I

12 Explain the different addressing modes of 8086 microprocessor.

13 Discuss the memory organisation of 8086 microprocessor.

Module II

14 Explain how ROM and EPROM are interfaced to the 8086 processor.

15 Describe the functional units present and their functions in BIU and EU of 8086.

Module III

16 Explain with block diagram the working of the 8251.

17 Explain the process of the DMA and the functions of various elements of the 8257.

Module IV

18 Explain the functional features of 8051 Microcontroller.

19 Explain the different serial communication modes in 8051.

(4 × 10 = 40 marks)

D 92093 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC/PTEC 09 504—DIGITAL COMMUNICATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is Quantization ?
2. What is slope overload distortion ?
3. What is ISI ?
4. Distinguish between MAP rule and ML rule.
5. Give the relation between Q-function and erfc function.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Derive Signal to Quantization Noise ratio for linear quantization if input to the quantizer is a sinusoidal signal.
2. A sinusoidal voice signal $g(t) = \cos 6000\pi t$ is to be transmitted using either PCM or DM. The sampling rate for PCM is 8 kHz and for transmission with DM, the step size is decided to be 31.25 mV. The slope overload distortion is to be avoided in DM. Assuming that the number of quantization levels for the PCM system is 64. Determine the bit rate. Which scheme is chosen for this application, PCM or DM ?
3. Binary data is transmitted at the rate of 56 kbps using a baseband binary PAM system designed to have a raised cosine spectrum. What is the transmission bandwidth required if the roll-off factor is $\alpha = 0.25$ and 0.5.
4. In DSSS-CDMA, the data rate R_b = 6 kbps and the chip rate R_c = 12 Mbps. What is the JM if an output SNR of 10 dB is required for a Pc = 10^{-5} ? Also, find the JM if we include a system loss of 1.5 dB owing to imperfections in tracking and detection.

Turn over

5. Two signals $s_1(t)$ and $s_2(t)$ are given in Fig. 1. (a) Using Gram-Schmidt orthogonalization procedure, express these signals in terms of orthonormal basis function, (b) Plot the obtained orthonormal basis function.

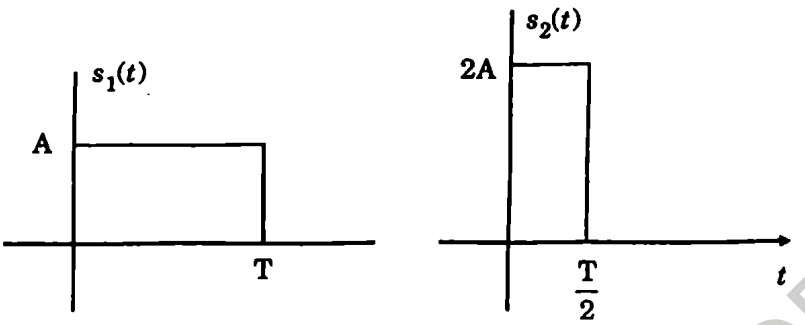


Fig. 1 : Signals $s_1(t)$ and $s_2(t)$

6. Determine the bit error probability for BPSK system having a bit rate of 1 Mbps. The receiver receives the waveforms, $s_1(t) = A\cos(2\pi f_c t)$ and $s_2(t) = -A\cos(2\pi f_c t)$, $0 \le t \le T_b$. The received signals are coherently detected using matched filter. If A = 10mV and single sided noise spectral density, $N_0 = 10^{-11}$W/Hz. Assume signal power and energy per bit are normalised. Given, erfc (2.24) = 0.001536.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. Prove that original signal can be reconstructed from the samples by passing the samples through a low-pass filter.

Or

Explain different line coding schemes with neat diagrams.

2. Derive the frequency response and impulse response of Duobinary encoder.

Or

Explain the principle of Gram-Schmidt Orthogonalization procedure.

3. Explain the block diagram for Correlation receiver based on Maximum likelihood decoding.

Or

(a) Explain the principle of Direct Sequence Spread Spectrum with neat block diagram.

(b) Prove that spread spectrum signals are immune to interference.

4. Derive an expression for probability of error for coherent QPSK.

Or

Derive an expression for probability of error for coherent BFSK.

(4 × 10 = 40 marks)

D 92092 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC/PTEC 09 503—ELECTROMAGNETIC FIELD THEORY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. State Stokes theorem.
2. What is meant by displacement current ?
3. What is meant by distortionless transmission line ?
4. Define uniform plane waves give their features.
5. What is standing wave ratio ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Differentiate between vector magnetic potential and scalar magnetic potential.
7. Derive Poisson and Laplace equations.
8. What is meant by depth of penetration ? Find the depth of penetration in copper at 1 MHz which has a conductivity of $\sigma = 5.8 \times 10^7$ mho/m. and a permeability approximately equal to freespace.
9. Derive standard transmission line equations.
10. Define divergence and curl. State divergence theorem.
11. What are the applications of cavity resonators ?

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Given point (– 2, 6, 3) and vector $A = y_{a_x} + (x + z)\, a_y$. Express P and A in cartesian and cylindrical co-ordinates.

(10 marks)

Or

(b) Derive continuity equation and also energy stored in magnetic field.

(10 marks)

13. (a) (i) Obtain the relation between E and H for uniform planewaves. (6 marks)

(ii) List all Maxwells equations in integral form. (4 marks)

Or

(b) What is Poynting theorem ? Derive the equation for complex Poynting vector.

(10 marks)

14. (a) (i) Derive an expression for reflection coefficient of a plane wave under oblique incidence with parallel polarization at adielectric interface.

(5 marks)

(ii) Derive the wave equations for conducting medium (5 marks)

Or

(b) What is meant by polarization ? Differentiate between linear, circular and elliptical polarization.

(10 marks)

15. (a) What are waveguides ? What are the different modes of propagation in rectangular waveguides ? Explain with suitable equations.

(10 marks)

Or

(b) (i) Define reflection coefficient and VSWR of a transmission line and derive the relation between reflection coefficient and VSWR.

(7 marks)

(ii) Explain briefly about stub matching. (3 marks)

[4 × 10 = 40 marks]

D 92091 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC/PTEC 09 502—QUANTITATIVE TECHNIQUES FOR MANAGERIAL DECISIONS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. List the applications of decision tree.
2. Compare PERT and CPM.
3. What is economic order quantity ?
4. What is linear programming problem ?
5. What is an assignment Problem ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. List the essential characteristic of a good decision.
7. State the rules for network diagram.
8. Suggest five ways of reducing wastes through effective stores operations.
9. What do you mean by PERT and CPM ? List their uses in managerial planning and control.
10. Explain the difference between slack and surplus variable.
11. Give the mathematical formulation of an assignment problem.

(4 × 5 = 20 marks)

Turn over

Part C

Answer any **one** *question from each module.*
Each question carries 10 *marks.*

Module I

12. What is decision tree? How does it help in decision making ? Discuss the limitations.

13. Discuss the distinct phases of CPM.

Module II

14. Describe methodology for inventory situation modelling.

15. A manufacturer uses an item at a uniform rate of 25,000 units per year. Assume that no shortage is allowed and delivery is at an infinite rate. The ordering, receiving and hauling cost is Rs. 23 per order, while inspection cost is Rs. 22 per order. Interest costs is Rs. 0.056 and deterioration and obsolescence cost is Rs. 0.004 respectively per year for each item actually held in inventory plus Rs. 0.02 per year per unit based on the maximum number of units in inventory. Determine the EOQ. If lead time is 40 days, find reorder level.

Module III

16. Write the steps for solving Linear Programming Problem by Graphical method. State its limitations

17. Sudhakaran has two iron mines. The production capacities of the mines are different. The iron ore can be classifies into good, mediocre and bad varieties after certain process. The owner has decided to supply 12 or more tons of good iron, 8 or more tons of mediocre iron and 24 or more tons of bad iron per week. The daily expense is Rs. 2000 and that of the second mine is Rs. 1600. The daily production of each type of iron is given in the table. Formulate the LPP.

Mine	Daily production		
	Good	Mediocre	Bad
I	6	2	4
II	2	2	12

Module IV

18. Explain the steps for solving an assignment problem by MODI method.

19. Describe the step stone method for solving an assignment problem.

(4 × 10 = 40 marks)

D 92090 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Electronics and Communication Engineering

EC/PTEC 09 501—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Obtain the circular convolution of $x_1(n) = \{2,1,2,1\}$ and $x_2(n) = \{1,2,3,4\}$.
2. Compare the characteristics of FIR and IIR filters.
3. Prove that the ideal high pass filter is not physically realizable.
4. What are limit cycle oscillations ?
5. What is pipelining ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. State and prove any two properties of DFT.
7. Convert the analog filter to a digital filter by impulse invariant transform method for T = 1 sec

$$H(s) = \frac{s+1}{(s+1)^2+1}.$$

8. Write short notes on general purpose dsp processors.
9. Explain errors due to rounding and truncation in digital signal processing.
10. Let $x(n)$ be a 8 point sequence with DFT $X = [1,1-j,1,01,0,1,1+j]$. Using the properties of DFT , determine the DFTs of the following :

    (i) $x(n)e^{j(2\pi/8)n}$. (ii) $\partial[(n-2)]_8$.

11. Prove that if z_1 is a root of linear phase FIR filter, then $\frac{1}{z_1}$ is also a root.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Perform linear convolution of the following sequences using overlap add method :

$x(n) = \{1,-1,2,-2,3,-3,4,-4\}$; $h(n) = \{-1,1\}$.

Or

(b) Find the 8 point DFT of the real sequence {1 , 2 ,2 ,2 ,1, 0,0,0} using DIFFFT algorithm.

13. (a) Draw direct form 1 and direct form 2 in block diagram structure for the system described by the difference equation $y(n) = x(n) + 1/2x(n-1) + 3y(n-1) - 2y(n-2)$.

Or

(b) Obtain the parallel form realisation of the IIR system function

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}.$$

14. (a) Design a low-pass filter with rectangular window by taking 9 samples of w (n) and with cut-off frequency 1.2 rad/sec. Also find H (z).

Or

(b) Determine the coefficients of a linear phase FIR filter of length N = 15 which has a symmetric unit sample response and frequency response that satisfies the condition :

$$H(2\pi k/N) = 1, k = 0,1,2,3$$
$$= 0.4, k = 4$$
$$= 0, k = 5,6,7.$$

15. (a) Draw and explain the internal architecture of TMS320 series processor.

Or

(b) Explain Harvard architecture for signal processing.

(4 × 10 = 40 marks)

D 92089 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH/PTCH 09 506—PROCESS INSTRUMENTATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. (a) Enlist the important functional elements of an instrument.

   (b) What is Thomson effect ?

   (c) What is hydrometer ?

   (d) What is meant by the term weir ?

   (e) Define the term moisture content.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

II. (a) Illustrate briefly about the construction and working of bimetallic thermometers.

   (b) Discuss shortly on the construction and working of optical pyrometer with neat diagram.

   (c) Briefly discuss on the working of McLeod gauge with neat sketch.

   (d) Discuss shortly about the construction and working of thermal conductivity gauge.

   (e) Illustrate briefly about the working of electromagnetic flow meter with neat sketch.

   (f) Briefly discuss about the dew point measuring instrument with neat diagram.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

III. (a) Explain in detail about the thermistors- resistance characteristics and their applications.

Or

(b) Discuss in detail about the Seebeck and Peltier effect.

IV. (a) Explain in detail about the Prandtl and air type micromanometer with neat sketches.

Or

(b) Explain in detail about the construction and working of Bourdon Tube and Barometer method for atmospheric pressure measurement with neat sketches.

V. (a) Illustrate in detail about the construction and working of rotating disk and turbine type positive displacement flow meters with neat sketches.

Or

(b) Explain in detail about the direct and indirect method of level measurement with neat sketches.

VI. (a) Explain in detail about the instrumentation and working principle of mass spectrometry with neat sketch.

Or

(b) Discuss in detail about the instrumentation and working principle of polarography with neat diagram.

(4 × 10 = 40 marks)

D 92087 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH/PT CH 09 504—MASS TRANSFER OPERATIONS–I

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is molecular diffusion ?
2. Write the advantages of using regular packings.
3. Illustrate the Equilibrium distribution curve and operating line for an absorber.
4. What is wet bulb temperature ?
5. Write the significance of physisorption.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Write briefly about the steady state diffusion of gas A through stagnant gas B.
7. With a neat diagram explain briefly about the working principle of venturi scrubber.
8. Discuss briefly about the construction and working of forced draft cooling tower with neat sketch.
9. Explain briefly about construction and working principle spray humidifier with neat sketch.
10. Explain the drying curves with brief mention on all the three phases of drying.
11. Obtain the expression for the material and energy balance for a continuous dryer with neat sketch.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) Calculate the rate of diffusion of acetic acid (A) across a film of non-diffusing water (B) 1 mm thick at 290 K if the concentration of acetic acid on the opposite sides of the film is 9% and 3 % respectively. The densities of 9% and 3% solutions are 1012 and 1003.2 kg/m^3 respectively. The diffusivity of acetic acid in water is 0.95 × 10^{-9} m2/s.

Or

(b) Explain the film theory and penetration theory used to determine the mass transfer co-efficient.

13. (a) Benzene is to be recovered from coal gas by scrubbing it with wash oil as an absorbent. Absorber handles 900 m^3/h of coal containing 2 % by volume benzene. Coal gas enters at the temperature of 300 K and at 107.324 kPa pressure. 95% benzene should be recovered by the solvent. The solvent enters at 300 K containing 0.005 mole fraction of benzene and has an average molecular weight of 260. Calculate the circulation rate of oil per hour if the column is to be operated at 1.5 times the minimum oil circulation rate.

Or

(b) Explain in detail about the characteristics of tower packing and types of packing material.

14. (a) Describe in detail about the various types of packed cooling tower arrangements with neat diagrams.

Or

(b) With neat sketch explain in detail about the construction and working principle of draft tube baffle crystallizer and the same type of crystallizer with elutriation leg.

15. (a) Explain in detail about the tray dryer and two truck dryer with neat sketches.

Or

(b) Write a detailed note on unsteady state fixed bed adsorber including adsorption wave with neat sketch.

(4 × 10 = 40 marks)

D 92086 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH /PTCH 09 503—PROCESS HEAT TRANSFER

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Illustrate the Fourier's law of heat conduction.
2. What are the different modes of heat transfer ?
3. Illustrate the expression to determine the rate of heat transfer by convection.
4. What is grey body ?
5. What are the liquid characteristics to be considered during the design of an evaporator ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. The two sides of a wall (2 mm. thick with a cross-sectional area of 0.2 m^2) are maintained at 30°C and 90°C. The thermal conductivity of the wall material is 1.28 W/(m°C). Find out the rate of heat transfer through the wall ?
7. Differentiate between the natural convection and forced convection with neat diagrams.
8. Illustrate the empirical equations for the heat transfer coefficient calculations in forced convection with laminar and turbulent flow.
9. Explain briefly about the working principle of double pipe heat exchanger with neat diagram.

10. Write briefly about the construction details of different types of extended surface heat exchangers with neat diagrams.

11. Describe briefly about the boiling point elevation and scale formation effect.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. (a) (i) 60 mm. Outer Diameter tube is insulated with a 50-mm. layer of silica foam, for which the conductivity is 0.055 W/m°C, followed with a 40-mm layer of cork with a conductivity of 0.05 W/m°C. If the temperature of the outer surface of the pipe is 150°C and the temperature of the outer surface of the cork is 30°C, calculate the heat loss in watts per meter of pipe.

(ii) Develop an expression to determine the heat flow through a series of layers of plane wall consisting of three layers having different thermal conductivity in compound resistances.

Or

(b) (i) Obtain an expression to determine the rate of heat transfer through the thick walled cylinder.

(ii) One side of a 1 cm. thick stainless steel wall (k_1 = 19 W/m°C) is maintained at 180 °C and the other side is insulated with a layer of 4 cm. fiberglass (k_2 = 0.04 W/m°C). The outside of the fiberglass is maintained at 60 °C and the heat loss through the wall is 300 W. Determine the area of the wall ?

13. (a) (i) Air flows over a rectangular plate having dimensions 0.5 m. × 0.25 m. the free stream temperature of the air is 300°C. At steady state, the plate temperature is 40°C. If the convective heat transfer coefficient is 250 W/m^{2}K, determine the heat transfer rate from the air to one side of the plate.

(ii) Describe briefly about the film and drop wise condensation with neat diagrams.

Or

(b) Write in detail about the relation between the heat flux versus temperature drop and heat transfer coefficient versus temperature drop for boiling water with different regimes of boiling.

14. (a) Explain briefly about the temperature profile for parallel and counter current flow heat exchanger with neat sketch and describe briefly about the construction and working principle of and 1-2 pass heat exchanger with neat sketch.

Or

(b) Steam in the condenser of a power plant is to be condensed at a temperature of 30°C with cooling water from a nearby lake, which enters the tubes of the condenserat 14°C and leaves at 22°C. The surface area of the tubes is 45 m^2, and the overall heat transfer co-efficient is 2100 W/m^2 °C. Determine the mass flowrate of the cooling water needed and the rate of condensation of the steam in the condenser.

15. (a) In an evaporator, an aqueous solution containing 10 % solids is to be concentrated to 50 % solids at the rate of 10,000 kg./hr. Saturated steam at 205 kN/m^2 absolute pressure is available at 121°C. Feed solution is available at 21°C. Overall heat transfer coefficient for single stage operation may be assumed as 1100 W/m^2K. Heat capacity of solution can be assumed as = 4180 J/kg. K. Boiling point rise of solution may be neglected. Evaporation system can be operated under vacuum at 13.3 kN/m^2. Boiling point of water at 205 kN/m^2 = 121 °C. Boiling point of water at 13.3 kN/m^2 = 52 °C. Latent heat of vaporization at 205 kN/m^2 = 2200 kJ/kg. Latent heat of vaporization at 13.3 kN/m^2 = 2377 kJ/kg. Calculate the amount of water evaporated, amount of steam consumed, economy of an evaporator and area of heat transfer.

Or

(b) With neat diagrams, describe in detail about the various methods feeding and pattern of liquor flow in multiple effect evaporators.

(4 × 10 = 40 marks)

D 92085 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH/PTCH 09 502—PETROLEUM REFINERY ENGINEERING AND PETROCHEMICALS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. (a) What are the methods available to test kerosene ?

   (b) Illustrate the uses of bitumen.

   (c) How do you classify dewaxing methods ?

   (d) Illustrate the purpose of isomerization process.

   (e) What are the aromatics produced in refinery ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

II. (a) Discuss briefly about the penetration test procedure for bitumen with neat sketch.

   (b) Discuss shortly on electric desalting of crude.

   (c) With neat sketch explain briefly about the ethanol amine treatment for LPG with neat flow sheet.

   (d) Explain briefly on the process description of hydrofluoric acid alkylation process with neat flow sheet.

   (e) Discuss briefly about the isomax hydro cracking process with neat flow sheet.

   (f) Discuss shortly about the different reactions involved in the production process of phenol from benzene.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

III. (a) Describe in detail about the softening point test method available to check the property of bitumen and smoke point test available to check the property of kerosene with neat sketches.

Or

(b) Give a detailed note on composition of crude oil.

IV. (a) Describe in detail about the treatment of kerosene using liquid sulphur dioxide for the extraction of aromatics present in kerosene with neat flow sheet.

Or

(b) Explain in detail about the MEK dewaxing process with neat flow sheet.

V. (a) Elaborate in detail about the process description of fluidized bed catalytic cracking with neat flow sheet.

Or

(b) Describe in detail about the catalytic reforming and plat forming processes with neat flow sheets.

VI. (a) Describe in detail about the process description with the reaction involved in steam cracking of naphtha with neat flow sheet.

Or

(b) Explain the process of production of mono ethylene glycol with neat flow diagram.

(4 × 10 = 40 marks)

D 92084 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2009 SCHEME] EXAMINATION, NOVEMBER 2020

Chemical Engineering

CH/PTCH 09 501—CHEMICAL REACTION ENGINEERING

Time : Three Hours Maximum : 70 Marks

Graph sheets may be provided to the students.

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. List the types of reactions based on their classification.
2. Differentiate between molecularity and order of reactions.
3. Explain how the batch reactor data of a zero order reaction is analyzed using integral method of analysis.
4. Differentiate between supported and unsupported catalysts.
5. Define and explain adsorption isotherms.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Sketch the energies involved in the transformation of reactants to products in an elementary reaction.
7. An elementary vapour phase homogeneous reaction $2A \rightarrow R$ is carried out under isothermal and isobaric conditions. The reaction mixture initially contains 80% of A and 20% of inerts. Calculate the % volume change of reaction mixture for 50% conversion of A.
8. Define recycle ratio associated with recycle reactors. Write the effect of varying the recycle ratio from zero to infinity on the performance of the recycle reactor.
9. Explain autocatalytic reactions and develop the rate equation.

10. Exit age distribution functions and intensity functions are used in the RTD study of reactors. Explain the features of any one of the exit age functions and sketch the exit age function of an ideal PFR and CSTR.

11. List the sequence of steps involved in solid catalyzed reaction with neat diagram.

(4 × 5 = 20 marks)

Part C

Answer any **one** *question from each module.*
Each question carries 10 *marks.*

Module I

12. Experiment shows that the homogeneous decomposition of Ozone proceeds with as per the following a rate expression. $-r_{O_3} = K[O_3]^2[O_2]^{-1}$. Here K is the rate constant.

Suggest a two step mechanism to explain this rate and explain how would you further test this mechanism.

Or

13. A constant density first order reaction $A \rightarrow P$ is carried out in a batch reactor. The experimental data is given below :

Time (s)	30	60	90	120	150	180	600
Concn. of A (mol/litre)	0.74	0.55	0.42	0.29	0.24	0.16	0.0025

If the initial concentration of A is 1 kmol/m^3, determine the rate constant for the reaction.

Module II

14. The gas reaction $2A \rightarrow R + 2S$ is approximately second order with respect to A. When pure A is introduced at 1 atm. into a constant volume batch reactor, the pressure rises 40% in 3 minutes. For a constant pressure batch reactor calculate :

(a) the time required for the same conversion.

(b) the fractional increase in volume at that time.

Or

15. Derive the energy balance equation for an adiabatically operated CSTR.

Module III

16. Explain any two models for non-ideal flow in reactors. Also explain how you would get the conversion in the reactors using the models.

Or

17. The following table gives the output concentration of a tracer following a pulse input into a closed vessel which is to be used as a chemical reactor. Calculate the mean residence time of fluid in the vessel and tabulate and plot the E curve.

Time (min)	1	5	10	15	20	25	30	35
Tracer output concentration (g/litre of fluid)	0	3	5	5	4	2	1	0

Module IV

18. Explain the physical properties of catalysts and their preparation.

Or

19. Explain film theory and Surface renewal theory in gas-liquid reactions.

(4 × 10 = 40 marks)

D 70752 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Printing Technology Engineering

PT 09 505—MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is need for timing diagram ?
2. Define instruction cycle, machine cycle and T-state.
3. How the program returns from the subroutine ?
4. Explain priority interrupts of 8085.
5. Draw the program memory organization in 8051.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Explain the architecture of 8085 microprocessor.
7. Explain the conditional RET instructions.
8. Comment on the size of the stack. What are the software instructions related to stack operations ?
9. Explain I/O mapped I/O interfacing technique.
10. Explain the Timer modes of operation of 8051.
11. Explain how serial communication is performed in 8051 microcontroller.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) Explain the internal architecture of the 8085 microprocessor and what operations can be performed with the data.

Or

(b) Explain and give one example each of the five types of addressing modes.

13. (a) Explain with the help of a block diagram, a typical programmed data transfer scheme.

Or

(b) Draw the Interrupt Acknowledge cycles for (a) RST instruction (b) CALL instruction.

14. (a) Explain the interrupt circuit diagram for 8085.

Or

(b) Draw the SIM instruction format and discuss.

15. (a) Explain the Programs for Keyboards of a 8051 microcontroller.

Or

(b) Explain the Interrupt Enable (IE) register and Interrupt Prioritu (IP) register of 8051 microcontroller.

(4 × 10 = 40 marks)

D 70651 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2014 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Aeronautical Engineering

AN 14 503—PROPULSION—I

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **eight** *questions.*

I. 1 Show various processes occurring in the Turbojet engine on a T-S diagram. How would it change for a reheat cycle ?

2 Explain any *one* method of thrust augmentations techniques.

3 Differentiate between subcritical and supercritical modes of inlet operation.

4 With a neat sketch explain the working of different types of combustion chamber.

5 What are the various factors that affect the combustion chamber performance ? Discuss.

6 Explain the Limiting Factors of Turbine Design

7 Write short notes on engine back pressure control.

8 Illustrate and explain the limiting factors in gas turbine design.

9 What are the types of nozzle ? Explain various operating conditions of a C-D nozzle with suitable sketch.

10 Describe three methods for avoiding surge of axial compressor.

(8 × 5 = 40 marks)

Part B

Answer **all** *the questions.*

II. (1) (a) Explain thrust developed in a gas turbine engines. (6 marks)

(b) A turbojet operates at sea level moves at 243.8 m/s. It ingests 113.4 kg/s of air and has negligible fuel flow. The diameter of the exit is 0.762 m. The exit pressure is 151.7 kPa, and the exit velocity is 396.2 m/s. Find the developed thrust.

(9 marks)

Or

(2) Explain in details about the different methods of thrust augmentation. Draw T-S diagram for turbojet engine with thrust augmentation.

Turn over

(3) What are the performance parameters of a combustion chamber and how do you evaluate the combustion chamber performance ?

Or

(4) What is meant by starting problem of supersonic inlets ? Sketch two different supersonic inlet configurations and explain along with T-S diagram.

(5) (a) What is the need for matching of compressor and turbine ? Write down the matching procedure with suitable sketches.

(7 marks)

(b) Briefly discuss the methods of turbine blade cooling and mention its advantages and disadvantages.

(8 marks)

Or

6. The mean diameter of a turbine stage having equal inlet and outlet velocities leads to the following data. Mass flow = 20 kg/s, inlet temperature T_{01} = 1000 K, inlet pressure P_{01} = 4 bar. Axial velocity (constant through stage) C_a = 65°, Stage exit swirl angle α_3 = 10°. Determine the rotor blade gas angles, degree of reaction, temperature drop co-efficient and power output. Assuming a nozzle loss co-efficient γ_N = 0.05, calculate the nozzle throat area required ignoring the effect of friction on the critical conditions.

7. Draw a neat diagram of multi stage compressor and explain functions of all parts and its working principle.

Or

8. A sixteen-stage axial flow compressor is to have a pressure ratio of 6.3. Tests have shown that a stage total-to-total efficiency of 0.9 can be obtained for each of the first six stages and 0.89 for each of the remaining ten stages. Assuming constant work done in each stage and similar stages find the compressor overall total-to-total efficiency. For a mass flow rate or 40 kg/s. determine the power required by the compressor. Assume an inlet total temperature of 288 K.

(4 × 15 = 60 marks)

D 70750 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Biomedical Engineering

BM 09 506—MEDICAL INSTRUMENTATION

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What are the two approaches generally used to measure the electrical signal from a spectrophotometer ?
2. List the advantages of capillary electrophoresis.
3. Define air and bone conduction.
4. What are the undesirable artefacts present on ECG trace ?
5. What is ventricular fibrillation ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. List the advantages and disadvantages of pulse oximeter.
7. Explain about the dye dilution method.
8. What is the use of spirometry ? Brief about basic spirometer.
9. How any arrhythmia monitoring system works ?
10. What are the basic requirements for any implantable circuits ?
11. Write short notes on electrode used in defibrillators.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) With clear sketch, explain the various components involved in spectrophotometer type instruments.

Or

(b) Discuss the basic gas chromatographic system. Elaborate the parts and functions.

13. (a) Elaborate about the impedance technique used for measurement of cardiac output.

Or

(b) Draw the schematic diagram of Haemodialysis machine. Explain its operation.

14. (a) What are the various methods available for the computerized analysis of EEG ? Explain.

Or

(b) What is exercise stress technique ? What is it used for ? Elaborate in detail.

15. (a) Describe in detail about the programmable pacemakers with its block diagram.

Or

(b) Explain the construction and working of advisory external defibrillator.

(4 × 10 = 40 marks)

D 70749 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Biomedical Engineering

BM 09 505—BIOSENSORS AND TRANSDUCERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*

Each question carries 2 *marks.*

1. What is the purpose of a transducer ?
2. Give two examples of biological sensor.
3. What is electrode ?
4. What is strain gauge ?
5. What is flow meter ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Write a note on primary and secondary transducers.
7. What is a chemoreceptor ? Explain.
8. Write short notes on calomel electrode.
9. What is RTD ? Explain.
10. What is RVDT ? Explain.
11. Write a note on hair hygrometer.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*

Each question carries 10 *marks.*

12. Give an account on neural mechanism.

Or

13. Explain the principle and working of sensors for sound vision and taste.

14. Give an note on principle and working of electrochemical sensors.

Or

15. Write short notes on hydrogen electrode and catheter type electrode.

16. Explain the principle, working and applications of electromagnetic transducers.

Or

17. Discuss about opto-electronic transducer and Temperature transducers.

18. Write a detailed note on electromagnetic flow meter.

Or

19. Explain : (a) EEG electrode potential ; (b) Surface electrode ; and (c) Electrode impedance.

(4 × 10 = 40 marks)

D 70748 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Biomedical Engineering

BM 09 504—COMPUTER ORGANIZATION AND ARCHITECTURE

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is addressing mode ?
2. What is execution time/response time ?
3. What are the use of interrupts ?
4. When can you say that a number is normalized.
5. Define parallel processing.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What are the most common fields of an instructions format ?
7. Name some of the IO devices.
8. Write the add/substract rule for floating point numbers.
9. Why floating point number is more difficult to represent and process than integer.
10. What are the steps required for a pipelined processor to process the instruction ?
11. How addressing modes affect the instruction pipelining ?

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Explain with an example how to multiply two unsigned binary numbers.

Or

13. Describe in detail the different kinds of addressing mode with an example.

14. Explain about magnetic tape systems CD-ROM systems.

Or

15. Write a note on Graphic Input Devices and printers.

16. Explain in detail the control sequence for an unbranch instruction and unconditional and conditional branch instruction.

Or

17. Write a note on Random Access Memory.

18. Write short notes on architectural classification of pipeline processors.

Or

19. Explain the principles of designing pipelined processors.

(4 × 10 = 40 marks)

D 70747 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Biomedical Engineering

BM 09 503—ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is TSS ?
2. What is Microprocessor ?
3. What is CALL instructions ?
4. Write a note on counter.
5. What is PIC Micro-controller ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Write short notes on memory paging.
2. Explain 'Branch Prediction Logic'.
3. What is Program Counter ? Explain.
4. Write a program to generate a delay of 2m sec using 8051.
5. Write short notes on program memory.
6. Write a note on Push Buttons.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

1. Explain the special features of Pentium Processor.

Or

2. Describe the architecture of 80386.

3. Explain the addressing modes of 8051.

Or

4. Explain stack pointer for 8051 register.

5. Write a program to interface a stepper motor to 8051.

Or

6. Describe how a keyboard in interfaced with 8051. Write a program to support it.

7. Describe the architecture of PIC Microcontroller.

Or

8. Write short note on CCP module in PIC.

(4 × 10 = 40 marks)

D 70746 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Biomedical Engineering

BM 09 501—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is FFT ?
2. What is meant by radix-2 FFT ?
3. What do you understand by input quantization error ?
4. What is meant by FIR filter ?
5. What is pipelining ?

(5 × 2 = 10 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. How to obtain the output sequence and linear convolution through circular convolution ?
7. State the properties of DFT.
8. Write a note on pre-warping.
9. What are the advantages and disadvantages of FIR filters ?
10. Mention the procedures for digitizing the transfer function of an analog filter.
11. Write a note on Multiplier and accumulator in DSP.

(4 × 5 = 20 marks)

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. Compute the 4 point DFT and FET – DIT for the sequence $x(n) = \{1, 1, 1, 3\}$ and what are the basic steps for 8-point FFT – DIT algorithm computation ?

Or

13. Find the DFT of a sequence by $x(n) = \{1, 2, 3, 4, 4, 3, 21\}$ using DIT algorithm.

14. Write a note on the effects of Co-efficient quantization in FIR filter.

Or

15. Write note on quantization errors occur due to finite word length registers in digital filters.

16. Explain the design of FIR filters.

Or

17. What is bilinear transformation ? Explain its advantages and disadvantages.

18. Explain the implementation of DSP algorithms for various operations.

Or

19. Explain about special purpose TMS320 series processor.

(4 × 10 = 40 marks)

D 70731 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2009 SCHEME] DEGREE EXAMINATION, NOVEMBER 2019

Production Engineering

PE 09 505—MACHINING OF MATERIALS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. Figuratively represent the single point cutting nomenclature.
2. Define the basic mechanics of forming a chip.
3. What is meant by flank wear of a single point cutting tool ?
4. State the general requirement of tool materials.
5. What is meant by material removal rate ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. What are the factors considered while selecting a cutting fluid ?
7. Suggest five ways to reduce the friction between chip and tool during cutting process.
8. Discuss about the basic requirement of dielectric fluid and also mention the dielectric fluid used in EDM.
9. With the aid of a sketch, describe the resultant forces acting on the single point cutting tool in orthogonal cutting.
10. With the aid of two dimensional graphs, describe the temperature distribution in flank of a single point cutting tool when it is used for machining a component.
11. Describe the essentially properties required for the cutting tool material to resist or retard the phenomena leading to random or early tool failure.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 10 *marks.*

12. (a) With the aid of a sketch, describe the nomenclature of any one multi-point cutting tool.

Or

(b) Explain in detail about five different machining process performed using lathe.

13. (a) (i) Enumerate the requirements of a dynamometer. (5 marks)

(ii) With the aid of a sketch, describe the method of measuring metal cutting forces by using dial indicator. (5 marks)

Or

(b) Figuratively explain in detail about the importance of Merchant's Circle Diagram (MCD) while measuring the cutting force , also mention the advantages and limitations of MCD.

14. (a) Explain in detail about tool life and tool wear measurement after machining.

Or

(b) Figuratively explain in detail about any one method of measuring tool chip interface temperature.

15. (a) Explain in detail about the operating principle and applications of water jet machining.

Or

(b) Describe the following with respect to ultrasonic machining :

(i) Operating principle. (6 marks)

(ii) Process parameters. (4 marks)

[4 × 10 = 40 marks]

D 13462 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electronics and Communication Engineering

EC 19 506 (E)—ELECTRONIC INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. List the functional elements of the measurement sytems.
2. Differentiate between Instruments and Instrumentation.
3. A voltmeter is calibrated to read from 100 V to 200 V. Its accuracy is specified with ± 2 %. Find the static error.
4. Draw the general configuration of Wheatstone bridge.
5. A potentiometer is provided with 50 turns per mm. The gearing arrangement is such that the motion of the main shaft by one resolution crosses 4 resolution. Determine the resolution of the potentiometer.
6. Write five applications of AC bridges.
7. Draw the schematic diagram of a DAC.
8. List the specifications of ADC.
9. Determine the resolution of a 16 bit ADC.
10. Draw the block diagram of RF signal generator.
11. List the advantages of digital storage oscilloscope.
12. What is an XY recorder ? How do you distinguish is from Xt and Yt recorders ?
13. What are the advantages of LCD over LED ?
14. Define the Q factor of an inductor.
15. Determine the dynamic range of a spectrum analyser with a third order intercept point of + 30 B_m and a noise level of – 90 dB_m.

(10 × 5 = 50 marks)

Part B

Answer **one** *question from each module.*
Each question carries 10 *marks.*

Module I

16. (a) What is measurment standard ? Discuss the different types of standards.

Or

(b) Explain on the static and dynamic characteristics of a measurement system.

Module II

17. (a) Draw the circuit of a Kelvin bridge used for measurement of low resistance and explain.

Or

(b) Explain how inductance is measured by using Maxwell's bridge.

Module III

18. (a) Discuss three bit R-2R type digital to analog converter.

Or

(b) Discuss the construction and operation of a LVDT.

Module IV

19. (a) Draw the diagram of XY recorder and explain its working.

Or

(b) Explain the working of pulse generator with block diagram.

Module V

20. (a) Explain the structure and operation of LCD.

Or

(b) Discuss the construction and working of power factor meter.

(5 × 10 = 50 marks)

D 13461 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electronics and Communication Engineering

EC 19 505—COMPUTER ARCHITECTURE

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. With a diagram, explain the logic of a carry look ahead adder.
2. Using Booth algorithm, multiply –13 and + 12.
3. Explain about the IEEE standard for floating point numbers.
4. What are registers in a computer ? List four registers normally available in any CPU.
5. Explain the concept of stored program organization with an example.
6. Illustrate about the various phases of an instruction execution cycle.
7. Explain the process of next address generation in a micro program sequencer.
8. Give the structure of a microinstruction format.
9. What is control memory ? Explain.
10. With reference to memory, explain about :
    (i) MAR ; (ii) MDR ; (iii) R/$\overline{w}$; (iv) MFC ; (v) CS.
11. Brief about flash memory system.
12. Illustrate the memory mapping techniques.
13. With a diagram, explain how a computer access I/O devices.
14. What are interrupts ? Why is it necessary ?
15. Explain briefly about bus arbitration.

(10 × 5 = 50 marks)

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. With a suitable diagram illustrate working of a Binary Division Process.

Or

17. With an approrpriate diagram, explain the floating-point addition-subtraction unit.

Turn over

18. Briefly illustrate the functions of the following instructions :

    (i) LDA ; and (ii) BSA.

Or

19. Describe the various steps involved in execution of a programme in a computer.

20. With a block diagram, explain the concept of microgrammed control organization.

Or

21. Briefly illustrate the steps involved the design of Control Unit of a CPU.

22. With a suitable diagram, explain the internal organization of a memory chip.

Or

23. With necessary diagram, explain how virtual-memory address translations are implemented.

24. Illustrate the concept of daisy chain in handling multiple interrupts.

Or

25. With appropriate diagram, illustrate the concept of DMA controller in a computer system.

(5 × 10 = 50 marks)

D 13460 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electronics and Communication Engineering

EC 19 504—ELECTROMAGNETIC WAVES

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Prove integral form and point form of continuity equation.
2. Derive the capacitance of a coaxial cable.
3. Explain Biot-Savart's law.
4. List Maxwell's equation for time varying fields in both integral and differential forms.
5. Explain the term skin effect.
6. What are the boundary conditions between two magnetic media ?
7. Explain Poynting's theorem.
8. Compute the Brewster angle of an electric field wave travelling in air and incident normally on a boundary between air and a dielectric having permittivity of 4.
9. Explain total internal reflection.
10. What is Smith chart ? List the applications of Smith chart.
11. A transmission line has the following parameters : $Z_L = 100 - j100\ \Omega$, $Z_O = 600\ \Omega$. Determine the standing wave ratio and reflection coefficient.
12. Discuss the need for impedance matching in transmission line.
13. Explain the structure of circular cylindrical wave guides.
14. Discuss the attenuation factor or constant of waveguide.
15. Discuss the advantages of waveguides.

(10 × 5 = 50 marks)

Part B

Answer **one** *question from each module.*
Each question carries 10 *marks.*

Module I

16. (a) Derive an expression for the magnetic vector potential.

Or

(b) Derive an expression for the energy stored in electric fields.

Turn over

Module II

17. (a) Obtain an expression for the free space impedance.

Or

(b) What are good conductors ? Obtain the expression for a good conductor.

Module III

18. (a) What is horizontally polarized wave ? Derive an expression for the reflection coefficient of horizontally polarized wave.

Or

(b) Derive an expression for Brewster angle for parallel polarized wave. List the applications.

Module IV

19. (a) Derive an expression for the characteristic impedance of a transmission line.

Or

(b) Describe the principle of single stub impedance matching.

Module V

20. (a) Explain the structure and properties of rectangular waveguide and circular waveguides.

Or

(b) Determine the cut-off frequency and the free space wavelength for the TE_{10} mode in a rectangular waveguide of dimensions 8 cm. and 4 cm. respectively, given that the distance between a voltage maximum and a minimum is 5 cm.

(5 × 10 = 50 marks)

D 13459 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Electronics and Communication Engineering

EC 19 503—DIGITAL COMMUNICATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. What is Aliasing ? How will you overcome it ?
2. Explain the limitations of Delta Modulation.
3. Determine the Nyquist rate and Nyquist sampling interval for the signal $g_1(t) = \sin c\, 100\, t$.
4. State and explain Nyquist criteria for zero ISI.
5. What is eye pattern ? Explain the use of eye pattern.
6. A communication channel of bandwidth 75kHz is required to transmit binary data at the rate of 0.1 Mbps using raised cosine pulses. Determine the roll off factor.
7. Distinguish between ML rule and MAP rule.
8. Explain about Maximum Likelihood decoder.
9. Distinguish between Likelihood function and Log likelihood function.
10. Explain the block diagram for the generation and detection of BPSK with necessary equations.
11. Write a short note on Differential Phase Shift Keying.
12. Compare the performance of various digital modulation schemes.
13. Explain about synthesis equation and analysis equation in the context of signal space representation of signals.
14. Explain the properties of pseudo noise sequence.
15. Write a short note on Maximal Length code.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each Section.*
Each question carries 10 *marks.*

16. (a) State and prove sampling theorem ?

    (b) Explain the block diagram for PCM.

17. (a) Derive the impulse response and frequency response of matched filter.

    (b) Derive the frequency response and impulse response for duobinary encoder.

18. (a) Explain the block diagram for correlation receiver.

    (b) Write a short note on :

        (i) Gaussian Random Process ; and

        (ii) Properties of Gaussian Random Process.

19. (a) Derive an expression for probability of error for BPSK.

    (b) Explain the block diagram for the generation and detection of BFSK with necessary equations.

20. (a) Given the signals $s_1(t), s_2(t), s_3(t)$ and $s_4(t)$, shown in Figure Use the Gram-Schmidt orthogonalization procedure to find orthonormal basis functions for the set of signals.

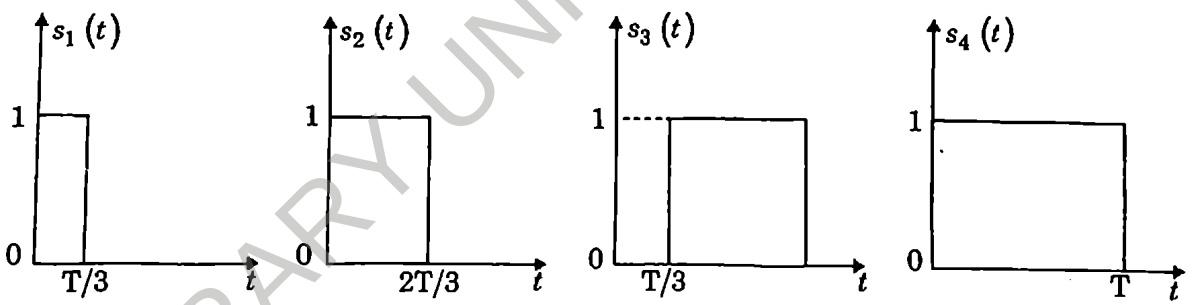


Figure 1 Signals $s_1(t), s_2(t), s_3(t)$ and $s_4(t)$.

(b) Write a short note on :

    (i) Gold sequence ; and

    (ii) Frame synchronization techniques.

(5 × 10 = 50 marks)

D 13458 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electronics and Communication Engineering

EC 19 502—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Find the number of complex multiplications involved in the calculation of a 256 point DFT using (i) direct computation ; (ii) radix-2 FFT algorithm.
2. Find the circular convolution of $x[n] = \{1, 2, 3, 4\}$ and $h[n] = \{2, 1, 2\}$.
3. Compute the 3 point DFT of $x(n) = \{1, 2, 3, 4\}$.
4. Write short note on limit cycle oscillations.
5. Briefly explain round off effects in digital filters.
6. Obtain the direct form-I realization of the system described by

   $$y(n) = 0.5y(n-1) - 0.25\, y(n-2) + x(n) + 0.4x(n-1).$$

7. Prove that, if $z1$ is a zero of a linear phase FIR filter, then $1/z1$ is also a zero.
8. Determine the frequency response of FIR filter defined by

   $$y(n) = 0.25x(n) + x(n-1) + 0.25x(n-2).$$

   Calculate the phase delay and group delay.
9. Compare the performance of FIR filter design using rectangular window and Hamming window.
10. Apply bilinear transformation of $H(s) = 2/(s+1)(s+2)$ with T = 1 sec. and find $H(z)$.
11. Using impulse invariance with T = 1 sec., determine $H(z)$ if $H(s) = \dfrac{1}{s^2\sqrt{2}s + 1}$.
12. What is meant by warping effect ?
13. With a neat sketch, explain Harvard architecture.
14. Explain the concept of pipelining.
15. Explain the role of accumulator in computer architecture.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. (a) Find the linear convolution of the following sequences using overlap add method :

$x(n) = \{1, -2, 2, -1, 3, -4, 4, -3\}, h(n) = \{1, -1\}.$

Or

(b) Given $x(n) = (1, 2, 3, 4, 4, 3, 2, 1)$, find X(K) using DITFFT algorithm.

17. (a) Explain representation of numbers and errors due to rounding and truncation.

Or

(b) Obtain the cascade and parallel realization of the system :

$$y(n) = -01.y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2).$$

18. (a) Design a low-pass filter with rectangular window by taking 9 samples of $w(n)$ and with cut-off frequency 1.2 rad./sec.

Or

(b) Determine the coefficients of a linear phase FIR filter of length N = 15 which has symmetric unit sample response and the frequency response is given by :

$$\begin{aligned} H(2\pi/N) &= 1; \quad k = 0,1,2,3 \\ &= 0.4; \quad k = 4 \\ &= 0, \quad k = 5,6,7. \end{aligned}$$

19. (a) Design a low-pass Butterworth filter to give a response of 3 dB or less for frequencies upto 2 kHz and an attenuation of 20 db or more beyond 4 kHz. Use bilinear transformation technique and obtain H(z) of the filter.

Or

(b) Design a Butterworth digital filter using bilinear transformation. The specification of the desired low-pass filter is :

$$\begin{aligned} 0.9 \le\ & |H(w)| \le 1; \quad 0 \le w \le \frac{\pi}{2} \\ & |H(w)| \le 0.2; \quad \frac{3\pi}{4} \le w \le \pi \end{aligned} \qquad \text{with T = 1 sec.}$$

20. (a) Explain the architecture of ADSP 21XX processor with neat diagram.

Or

(b) Explain in detail about special instructions for DSP.

(5 × 10 = 50 marks)

D 13457 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electrical and Electronics Engineering

EE 19 506(D)—ELECTRICAL MATERIAL SCIENCE

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

I. 1 What is electrical conductivity ? Obtain the expression for electrical conductivity of a metal.

2 Write short notes on ferrites.

3 Explain the magnetic materials used in electrical machines.

4 Define Polarization and what are different polarization processes.

5 Explain the properties of Mica and Ceramics.

6 State the factors affecting dielectric stregnth.

7 Explain Townsend's criterion for spark breakdown.

8 How breakdown due to liquid globules occur ?

9 Explain bubble theory.

10 List the properties of good insulator.

11 Outline the effects of ageing of insulators.

12 Tell about liquid insulators.

13 Draw and explain I-V curve of dark and illuminated junction.

14 What are the materials used for solar cells ? Explain.

15 Give the details of solar cell parameters.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

II. 1 Classify the magnetic materials and explain them in detail. Also distinguish hard and soft magnetic materials.

Or

2 State and explain Weiss theory of ferromagnetism with their applications.

3 Discuss any four dielectric parameters in detail.

Or

4 Explain the types of dielectric materials with its application.

5 Explain a break down mechanism in gases also discuss the factor on which dielectric strength of gaseous dielectric depends.

Or

6 Explain the following for breakdown in liquids :

(i) Suspended particle theory.

(ii) Colloidal theory.

7 Describe the applications of following insulating materials used in electrical apparatus :

(i) Liquid insulator ; (ii) Gaseous insualators ; (iii) Organic insulator ; (iv) Inorganic insulator.

Or

8 Identify suitable organic materials for insulators and explain them.

9 Explain the following in detail :

(i) Antireflection coating.

(ii) Solar selective coating.

(iii) Cold mirror coating.

Or

10 Explain the construction and working of solar cell with its characteristics.

(5 × 10 = 50 marks)

D 13456 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electrical and Electronics Engineering

EE 19 505—MICROPROCESSORS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

I. 1 Give the operation of minimum mode of 8086 microprocessor.

2 Explain the purpose of segment registers in 8086.

3 Classify the types of 8086 interrupts.

4 Illustrate some string instructions with its operation.

5 Outline processor control instructions with example.

6 Write an assembly language program to search a number in a string using 8086.

7 Write the basic concepts of modular programming.

8 Write an assembly language program for calculating the factorial of a number using 8086 microprocessor.

9 List the features of Pentium processor.

10 Explain the functional types used in control words of 8251.

11 Give the features of Interrupt controller 8259.

12 Write the different modes of operation of 8237.

13 What are the purposes of register banks in 8051 ?

14 Tell about flag bits.

15 Explain loop and jump instructions with suitable example.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

II. 1 Draw with neat sketch and explain the architecture of INTEL 8086 microprocessor.

Or

2 Describe the interrupt system of 8086 in detail with suitable examples.

Turn over

3 Enumerate the concept of Addressing modes and discuss its types.

Or

4 Write an assembly language program to convert a 8 bit BCD number into hexadecimal number using 8086 microprocessor.

5 Explain in detail about memory organization.

Or

6 Describe the function of Pentium processor with its architecture in detail with neat sketch.

7 Brief the concept of keyboard controller and interfacing with the assembly language program.

Or

8 Explain the block diagram and the functions of each block of the 8251 USART.

9 Discuss in detail about 8051 interrupts.

Or

10 Demonstrate the interfacing of microcontroller with Stepper motor control with suitable program.

(5 × 10 = 50 marks)

D 13455 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electrical and Electronics Engineering

EE 19 504—POWER SYSTEM-I—GENERATION, TRANSMISSION AND DISTRIBUTION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

I. 1 State factors to be considered for selection and of site for the NPS.

2 Write a short note : (i) Cooling towers ; (ii) Condenser.

3 Draw the schematic diagram of Solar pond and explain its working.

4 Outline the significance of load factor and diversity factor.

5 A power station has a maximum demand of 200 MW, a plant load factor of 0.6 a plant capacity factor of 0.5 and a plant use factor 0.8. Find the daily energy consumed.

6 Narrate about economics of power generation.

7 State and explain Kelvin's law for economic choice of conductor.

8 Explain the effects of Corona.

9 Generalize the factors affecting sag in a transmission line.

10 Define safety factor of insulator. Why it is desired to be high ?

11 A single core cable, 1.7 km. long, has a conductor radius of 13 mm. and insulation thickness of 5.8 mm. The dielectric has a relative permittivity of 2.8. Calculate the capacitance per meter length of cable.

12 Explain the line supports used in transmission and distribution systems.

13 Discriminate between self and mutual GMD.

14 Explain why the concept of self GMD is not applicable for capacitance calculation.

15 State skin effect in transmission line. Mention its effects on the resistance of the line.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

II. 1 Draw the schematic diagram of hydro electric power station. State the different methods of classifying hydro electric power plant and give the classification of HPS based on all three methods.

Or

2 State the merits and demerits of solar energy conversion and utilization. State various types of solar thermal collectors along with their advantages and disadvantages.

3 A power station is to supply four regions of loads whose peak loads are 10000 kW, 5000 kW, 8000 kW and 7000 kW. The diversity factor of the load at the station is 1.5 and average annual load factor is 60 %. Calculate the maximum demand on the station and annual energy supplied from the station. Suggest the installed capacity and number of units taking all aspects into account.

Or

4 Explain the different types of tariff in detail.

5 A string of five insulator units has mutual capacitance equal to 10 times the pin to earth capacitance, find voltage distribution across various units as the per cent of the total voltage across the string and string efficiency.

Or

6 Derive an expression for sag of a line supported between two supports of the same height. Also explain the effect of ice and wind loading.

7 A 2-wire, d.c. distributor 200 meters long is uniformly loaded with 2A/m. Resistance of single wire is 0.3 ohm/km. If the distributor is fed at one end calculate :

(a) The voltage drop up to a distance of 150 m. from the feeding point.

(b) The maximum voltage drop.

Or

8 With neat diagram, explain the various methods of grading of underground cables.

9 Derive the expression for calculation the internal and external flux linkages for a conductor carrying current. Use these expressions to derive the equation for the inductnace of a single-phase transmission line.

Or

10 A balanced three-phase load of 30 MW is supplied 132 kV, 50 Hz and 0.85 p.f. lagging by means of a transmission line. The series impedance of a single conductor $(20 + j\,52)$ ohm and the total phase neutral admittance is 315×10^{-6} Siemen. Using nominal T method. Determine (i) A, B, C and D constants of the line ; (ii) Sending end voltage ; (iii) Regulation of the line.

$(5 \times 10 = 50$ marks)

D 13454 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Electrical and Electronics Engineering

EE 19 503—ELECTRICAL MACHINES—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

I. 1 Explain the advantages of salient pole type construction used for synchronous machines.

2 Differentiate single layer and double layer winding.

3 What is the necessity of chording in the armature winding of a synchronous machine ?

4 Write the concept of transient and sub-transient reactances.

5 Explain the causes of voltage drop in an alternator when loaded.

6 What is meant by synchronizing ? State the conditions for paralleling alternator with infinite busbars.

7 Point out why synchronous motor is not a self-starting motor.

8 Discuss about 'Torque angle'.

9 Explain the role of synchronous condenser.

10 Why are the slots on the cage rotor of induction motor usually skewed ?

11 Describe wny an induction motor is called a 'rotating transformer'.

12 Identify the condition of maximum torque developed in three phase induction motor.

13 Draw the torque-slip characteristics of double-cage induction motor.

14 Develop the speed torque characteristics of single-phase induction motor.

15 Distinguish the terms rotating and pulsating magnetic fields.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

II. 1 The stator of a 3-phase, 16 pole alternator has 144 slots and there are 4 conductors per slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375 r.p.m., calculate the e.m.f. induced per phase. Resultant flux in the air-gap is 0.05 webers per pole sinusoidally distributed. Assume the coil span as 1500 electrical.

Or

Turn over

2 Explain with the phasor diagram of synchronous machine under loaded condition.

3 Describe how the direct and quadrature-axis reactances of a salient pole synchronous machine can be estimated by means of slip test.

Or

4 Illustrate the parallel operation of three-phase alternators with help of a neat diagram.

5 Explain briefly the features and principle of operation of three-phase synchronous motor with relevant diagrams.

Or

6 Discuss briefly the starting methods employed for the synchronous motors.

7 Describe the construction and working principle of 3-phase induction motor.

Or

8 A 100 kW, 330 V, 50 Hz, 3-phase, star connected induction motor has a synchronous speed of 500 r.p.m. The full load slip is 1.8 % and full load power factor 0.85. Stator copper loss is 2440 W, iron loss is 3500 W, and rotational loss is 1200 W. Calculate (i) rotor copper loss ; (ii) the line current ; and (iii) the full load efficiency.

9 Explain the following methods of speed control scheme :

(i) Cascaded connection ; (ii) V/f control.

Or

10 Explain why 1-phase induction motor is not self-starting. Also explain Double revolving field theory.

(5 × 10 = 50 marks)

D 13453 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Electrical and Electronics Engineering

EE 19 502—LINEAR CONTROL SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

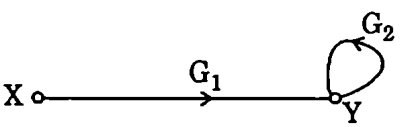
Answer any **ten** *questions.*
Each question carries 5 *marks.*

I. 1 Compare Open loop and closed loop systems.

2 Define transfer function and mention its applicability in control system.

3 State D'Alembert's principle.

4 Obtain the gain Y/X for the signal flow graph shown below:



5 For a system described by :

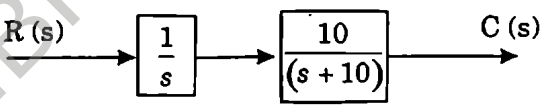
$$\frac{C(S)}{R(S)} = \frac{16}{S^2 + 8S + 16}.$$

Find the nature of the time response and justify.

6 List and explain the time domain specifications.

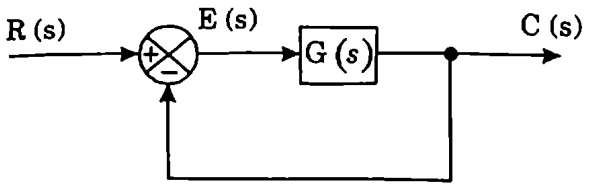
7 Write short notes on pulse transfer function.

8 A system is shown in fig. Find the rise time and settling time for this system :



9 Illustrate the Effect of poles and zeros and their location on the root locus.

10 For unity feedback system shown in fig. If input is $30t^2$, find the steady state error :



11 Explain, why frequency domain analysis is needed ?

12 Define corner frequency, gain crossover frequency and phase cross over frequency.

13 List and explain the advantages and disadvantages of phase lag network.

14 Outline Cascade Compensation.

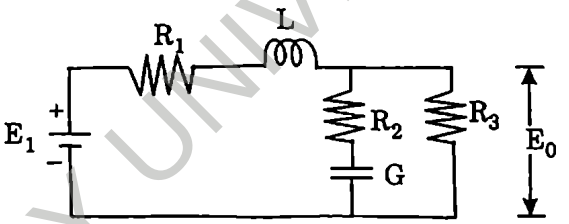
15 Explain briefly the PD controller action with block diagram and obtain its transfer function model.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions*
Each question carries 10 *marks.*

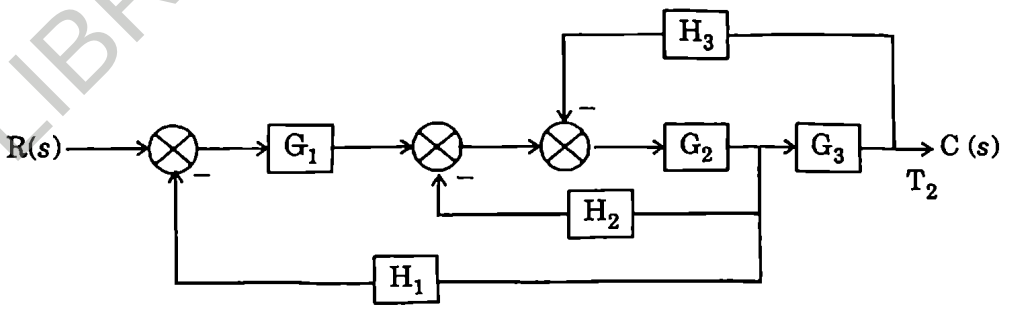
II. 1 Write the differential equations for the electric circuit shown in figure hence find Eo (s)/Ei (s) :



Or

2 Derive the transfer function of an armature controlled DC motor.

3 Reduce the block diagrams shown below :



Or

4. Evaluate the unit step response of the following system.

$$\frac{C(s)}{R(s)} = \frac{10}{s^2 + 2s + 10}$$

5. Consider the sixth order system with the characteristic equation.

$s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0.$

Use Routh-Hurwitz criterion to examine the stability of the system and comment on location of the roots of the characteristics equation.

6. A Unity feedback control system has an open loop transfer function G (S) = K (S + 1.5) / S (S + 1) (S + 5). Sketch the root locus.

7. Construct the polar plot for the function GH (S) =2 (S+1)/ S^2. Find Gain cross over Frequency, Phase cross over frequency, Gain margin and Phase margin.

Or

8. Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies G (S) – KS^2 / (1 + 0.2 S) (1 + 0.02 S). Determine the value of K for a gain cross over frequency of 20 rad/sec.

9. Design suitable lead compensators for a system unity feedback and having open Loop transfer function G (S) = K/ S (S + 1) to meet the specifications. (i) The phase margin of the system 45° ; (ii) Steady state error for a unit ramp input 1/15 ; and (iii) The gain cross over frequency of the system must be less than 7.5 rad/sec.

Or

10. Explain the procedure for design of Lag compensator.

(5 × 10 = 50 marks)

D 13452 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Printing Technology

PT 19 506 (D)—DESIGNING AND PLANNING FOR MEDIA PRODUCTION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Write a short note on human interpretation of movement.
2. Explain the characteristics of vision.
3. With the help of examples, explain metaphor and synecdoche.
4. Explain the visual ingredients of graphic design - Line, Texture, Point, Graphic space, Scale.
5. Explain legibility and readability.
6. Explain the difference between illustration and photography with the help of examples.
7. Explain the role of photographers in media production.
8. Write a short note on advertising agency.
9. Explain the design strategies used for books and magazines.
10. Explain the factors to be considered while designing a website.
11. Write a short note on content creation.
12. Explain the various tools used in preparing layout.
13. Explain the format of story board with an example.
14. Write a note on estimating procedures.
15. Explain the term marking up.

(10 × 5 = 50 marks)

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. a) Explain the limitations occurred in binding and finishing processes.

Or

b) Explain the factors to be considered while producing radio jingles.

17. a) Explain the role of graphic designer.

Or

b) Explain the types of images.

18. a) Explain the services provided by an advertising agency.

Or

b) Explain website hosting and maintenance.

19. a) Explain the production process of advertising commercials.

Or

b) Explain the problem occurred during media production.

20. a) Explain the factors to be considered in photography.

Or

b) Explain the important elements of a good brief.

(5 × 10 = 50 marks)

D 13451 (Pages : 4) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Printing Engineering

PT 19 505—MACHINE DYNAMICS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*

Each question carries 5 *marks.*

1. Differentiate higher pairs from lower examples with suitable examples.
2. Differentiate whit worth quick-return mechanism and crank and slotted lever mechanism.
3. With a neat sketch explain the working of the toggle press mechanism
4. Explain the consequences of not balancing a rotating or a reciprocating mass.
5. Explain the terms with respect to a vibration system : (i) Degrees of freedom ; and (ii) Critical damping.
6. What is meant by forced vibration ? List engineering applications where such vibrations are possible and are detrimental.
7. Derive the expression to find the minimum number of teeth on the pinion to avoid interference between involute gears.
8. Suggest gears as per the following constraints for some engineering applications. With sketch explain their salient features.
   (a) driver and driven shafts are parallel to each other. The gears should run making less noise.
   (b) driver and driven spindles are at right angles and have a velocity ratio of 1.
9. Derive the relation for the ratio of driving tensions of a V-belt.
10. What is the significance of endurance limit? Explain with a suitable example its real life usage.
11. What are rolling contact bearings ? List any *four* advantages of such bearings.
12. Define stress, strain, Young's modulus.

Turn over

13. How is the shaft designed when it is subjected to twisting moment only ?

14. What are the different types of material that can be used in making of springs ?

15. Show schematically at least 2 different types of keys that are used in machines. List their salient features.

(10 × 5 = 50 marks)

Part B

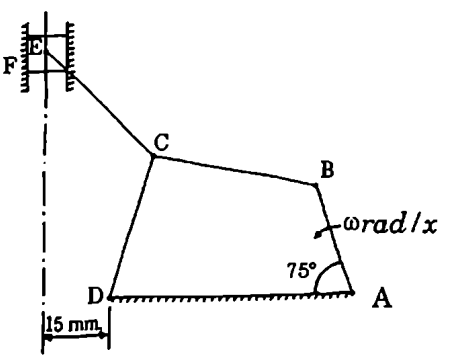
Answer **all** *questions.*
Each question carries 10 *marks.*

16. A cam turning clockwise with a uniform speed of 240 r.p.m. is to give the following motion to a roller follower of 16 mm. diameter. Follower to rise through a distance of 45 mm. during 120° rotation of the cam. Follower to dwell for the next 60° rotation of the cam. Follower to then return to its initial position during the next 120° of cam rotation. Follower to dwell for remaining period of 60° cam rotation. The minimum radius of the cam is 32 mm. and the line of stroke of the follower is offset 12 mm. from the axis of the cam towards the right. The displacement of the follower is to take place with S. H. M. motion on rise and with uniform acceleration and deceleration motion during return stroke. Draw the cam profile.

Or

17. In the mechanism shown in Fig. Q 17 below, the dimensions of various links are, AB = 30 mm, BC = 45 mm, CD = 40 mm, AD = 65 mm, CE = 40 mm. and angle DAB = 75°. The crank AB rotates at uniform speed of 600 r.p.m. in counterclockwise direction. Determine the linear acceleration of slider E and angular acceleration of link BC. The velocities of various links are tabulated below.

Link	Velocity m/s
AB	1.885
BC	1.15
CD	1.5
CE	1.95
SLIDER E	1.85



18. A rotating shaft carries four masses A, B, C and D which are readily attached to it. The mass centres are 30 mm, 38 mm, 40 mm. and 35 mm. respectively from the axis of rotation. The masses A, C and D are 7.5 kg, 5 kg. and 4 kg. respectively. The axial distances between the planes of rotation of A and B is 600 mm and between B and C is 500 mm. The masses A and C are right angle to each other, find for complete balance,

    (i) The angles between the masses B and D from mass A.

    (ii) The axial distance between the planes of rotation of C and D.

    (iii) The magnitude of mass B.

Or

19. A shaft is rotating at a uniform angular speed. Four masses M1 to M4 having magnitudes 30 kg, 45 kg, 36 kg and 40 kg. respectively are attached rigidly to the shaft. The masses are rotating in the same plane and the corresponding radii of rotation are 20 cm, 15 cm, 25 cm and 30 cm respectively. The angle made by these masses with the horizontal are 0°, 45°, 120° and 250° respectively. Determine the magnitude of balancing mass if the radius of rotation is 20 cm.

20. Following data relate to two meshing involute gears : Number of teeth on the gear wheel = 60, Pressure angle = 20°, gear ratio = 1.5, speed of the gear wheel = 100 r.p.m, Module = 8 mm. The addendum on each wheel is such that the path of approach and the path of recess on each side are 40 % of the maximum possible length each. Determine the addendum for the pinion and gear and length of arc of contact.

Or

21. A leather belt transmits 9 kW from a motor running at 520 r.p.m. by an open belt drive. The diameter of the driven pulley is 350 mm, center distance between the pulleys is 4 m. and speed of the driven pulley is 175 r.p.m. The belt weighs 1.100 g/cc and the maximum allowable tension in the belt is 3.5 N/mm^2. Co-efficient of friction = 0.25. Find the width of the belt assuming the thickness to be 10 mm. Neglect the belt thickness to calculate the velocities.

22. Design a suitable journal bearing for a machine. The load caused on the bearing is 14 kN. Diameter of the journal is 85 mm while the rotational speed is 25 r.p.s. Bearing characteristics number at the working temperature at 75 °C is 30. Safe bearing pressure intensity is 0.6 MPa to 1.2 MPa. Ambient temperature can be assumed to be 32 °C. Estimate the cooling requirement.

Or

23. A ball bearing is subjected to a radial force of 2.5 kN and an axial force of 1.5 kN. The dynamic load carrying capacity of the bearing is 7 kN. The value of X and Y factors 0.46 and 1.7 respectively. The shaft is rotating at 15 r.p.s. Estimate the life of bearing.

Turn over

24. A vertical spring loaded valve is required for a compressed air receiver. The valve is to start opening at a pressure of 1 MPa and must be fully open with a lift of 4 mm. at a pressure of 1.2 MPa. The diameter of the port is 25 mm. Assume the safe stress in the spring material to be 480 MPa and shear modulus as 80 kN/mm^2. Take K = [(4C – 1)/(4C – 40] + [0.615/C]. Standard wire diameters in mm are 12.7, 11.875, 10.973, 10.160, 9.940, 8.839, 8.229, 7.620, 7.010, 6.401, 5.893, 5.385, 4.877, 4.470, 4.064, 3.658, 3.251, 2.946, 2.642, 2.337, 2.032, 1.829, 1.626, 1.422, 1.219, 0.254, 0.233, 0.213, 0.193, 0.172, 0.152, 0.1321, 0.121, 0.111, 0.101, 0.091, 0.081, 0.071.

Or

25. Design a clamp coupling to transmit 30 kW power at 100 r.p.m. The allowable shear stress for the shaft and key is 40 MPa and the number of bolts connecting two halves are six. The permissible tensile stress for the bolts is 70 MPa. The co-efficient of friction between the muff and shaft surface can be taken as 0.3

(5 × 10 = 50 marks)

D 13450 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Printing Technology

PT 19 504—FLEXOGRAPHY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Explain the stack flexo press configuration with neat diagram and list its advantages and disadvantages.
2. Describe the molding press used for rubber plate making.
3. Describe with neat diagram the follower arm tension control system.
4. Describe the deflection of fountain roll, its reason and how to determine the deflection ?
5. Describe the mechanical principle of flexography with neat diagram.
6. Describe the mounting and demounting of plates on plate cylinder.
7. Explain the elements of control console and deck control of a flexo press.
8. What are the basic requirements of process color flexo printing ? Explain.
9. What are the different image carriers used for flexo printing ? Brief.
10. Explain the principle of working of two roll inking system with neat diagram.
11. Explain the anilox roller wear, its reason and what is the solution to avoid wearing of anilox roller.
12. Explain bench micrometers and thickness control bearers used for rubber plate making.
13. What is water based flexo printing ? What are the applications and the benefits ? Explain.
14. Describe the sheet fed flexographic printing press and its applications.
15. What is the purpose of mounting and proofing flexo plates ?

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each section.*
Each question carries 10 *marks.*

16. a) Explain the parts of an inline flexographic press with neat diagram and the function of each element.

Or

b) Describe the different types of gears used on flexographic presses. Mention the specific requirement of gear on each element of the press.

17. a) Explain the step by step procedure of making molded rubber plates.

Or

b) How do you prepare the photopolymer plates for process color printing? What are the requirements to be followed ? Explain.

18. a) Explain with neat diagrams two types of surface winders used on flexo presses.

Or

b) Define tension zones of a flexo press. Describe the level and pattern of tension to be maintained at each tension zone.

19. a) What are the different cell structures used on anilox roller ? Explain with simple diagrams and their applications.

Or

b) What are the things to be accomplished while checking the equipment before mounting and proofing of flexo plates? explain

20. a) What are the components and applications of narrow flexographic printing ? Explain.

Or

b) Write an essay on best press room practices to be followed in flexo industry.

(5 × 10 = 50 marks)

D 13449 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Printing Technology

PT 19 503—MICROPROCESSOR AND MICROCONTROLLER

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Describe how memory is organised for 8086 μP ?
2. Although 8086 is a 16-bit μP, it deals with 8-bit memory. Why ?
3. List the features of 8086 microprocessor.
4. Tabulate the Minimum mode signals and also mention their functions and types of 8086 microprocessor.
5. Discuss logical address, base segment address and physical address of 8086.
6. Mention the address capability of 8086 and show its memory map.
7. Draw the Isolated I/O memory and I/O address space.
8. What kind of I/O is used for IN and OUT instructions ?
9. What is the difference between Microprocessor and Microcontroller ?
10. Explain the Flags and the Program Status Word of a 8051 microcontroller
11. Explain the External Memory Timing of a 8051 microcontroller.
12. Bring out the differences between direct I/O instructions and variable I/O instructions.
13. Write an 8051-assembly program to find GCD of two numbers.
14. Explain the Programs for Keyboards of a 8051 microcontroller.
15. Explain the Stack and the Stack Pointer of a 8051 microcontroller.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full question from each section..*
Each question carries 10 *marks.*

16. A) Explain the architecture of 8086 microprocessor, with a neat diagram, along with functions of each block and register.

Or

B) Draw and discuss the architecture of 8086. Mention the jobs performed by EU (Execution Unit).

17. A) List the different subtraction arithmetic instructions of 8086 μP. Also list the allowed operands for (a) SUB and SBB ; (b) DEC ; and (c) NEG instructions.

Or

B) Explain (a) Register Addressing mode ; and (b) Immediate Addressing mode of 8086 μP with examples.

18. A) Discuss the priority of interrupts of 8086.

Or

B) Draw the schemes of (a) Min ; and (b) Max mode 8086 system external hardware interrupt interface and explain.

19. A) Describe the different modes of operation of timers/counters in 8051 with its associated register.

Or

B) Explain the Timer modes of Operation of a 8051 microcontroller.

20. A) Write an 8051-assembly program to convert two digits BCD number to hexadecimal number

Or

B) Explain how an intelligent LCD display of two lines, 20 characters per line, that is used to be interfaced to the 8051.

(5 × 10 = 50 marks)

D 13448 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Printing Technology

PT 19 502—PACKAGING TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Explain the tests done to determine the climatic hazards on package.
2. Explain the importance of colors in a package design with 2 examples.
3. Discuss various markings on package with neat sketches.
4. With neat sketches, explain different styles of cartons.
5. What are the advantages and applications of expanded polystyrene.
6. Discuss the function, types and applications of dessicants.
7. Discuss the features, advantages and applications of shrink packaging.
8. With neat sketch, explain the working principle of aerosol packaging.
9. Discuss the features, advantages and applications of strip packaging.
10. With neat sketch, explain the parts of a vertical form-fill-seal machine.
11. Discuss different ways of preserving wood.
12. Discuss the advantages, properties and applications of PVC and PET plastic substrates.
13. Discuss 5 different tests done on plastic substrates.
14. Describe closure. Explain its purposes and 2 types.
15. What are the advancements in food packaging ? Explain.

(10 × 5 = 50 marks)

Part B

Answer one full question from each section.
Each question carries 10 *marks.*

16. (a) Discuss various functions of a package.

Or

(b) Discuss various elements of package design.

17. (a) Discuss various methods of preventing corrosion.

Or

(b) Explain various functions and properties of cushioning materials.

18. (a) With neat diagram, explain the working of extrusion blow molding.

Or

(b) Explain different methods of vacuum forming with neat sketches.

19. (a) With neat diagram, explain the process of manufacturing glass.

Or

(b) Discuss different types of boards.

20. (a) Explain different types of labels.

Or

(b) Explain the designing of cans and metal tubes with neat sketches.

(5 × 10 = 50 marks)

D 13446 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Mechanical Engineering

ME 19 506 (A)—ENERGY ENGINEERING MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Explain the importance of renewable energy sources in current scenario of world energy consumption.
2. Discuss the objective and accountability of energy policy.
3. What do you understand by load curve ? What information are conveyed by load curve ?
4. What are various renewable energy sources ?
5. Explain nuclear energy generation.
6. Mention the impact of tidal energy power plants in the environment.
7. What are heat pipes ?
8. How do industry Nation and Globe would benefit from energy efficiency programs ?
9. Explain any three methods for controlling air pollution by thermal power plants.
10. Discuss types of energy audit.
11. How waste recovery system classified ?
12. Discuss heat regenerators.
13. What is cogeneration ?
14. Explain the concept of energy from waste.
15. Explain pinch technology.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

16. What is cause for the loss of biodiversity and how is biodiversity protected ?

Or

17. Discuss the various causes and effects of ozone layer depletion.

18. Discuss the advantages and limitations of vertical axis wind turbines over horizontal axis wind turbines.

Or

19. Explain the components and layout of a geothermal energy harvesting system.

20. What are the two distinct thermal energy storage systems ? What is the typical value of storage density of sensible heat energy storage ?

Or

21. Draw the general layout of a thermal power plant and explain the working of different circuits

22. Discuss about ECO in chemical and Electrical Industries.

Or

23. Explain type of bed is used in fluidized combustion boiler.

24. Discuss about the energy conservation measures adopted in India.

Or

25. Explain impact of energy on economy, development and environment.

(5 × 10 = 50 marks)

D 13445 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Mechanical Engineering

ME 19 505—METROLOGY AND INSTRUMENTATION

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. What is rotameter ? Explain its working principle.
2. List out the applications of Machine vision system.
3. Distinguish between Accuracy and Precision of an instrument.
4. Write short notes on (i) readability ; (ii) Dynamic response.
5. List out the errors in screw thread and gear.
6. What is a CMM probe ? Explain the various types of probes used in CMM.
7. Define R_a and R_z, with respect to surface roughness.
8. Give details about the zero, first and second order instruments.
9. Define strain gauges. Mention types of strain gauge.
10. What is meant by primary and secondary transducers ?
11. Write about the calibration system in metrology.
12. Enumerate the method of determining an absolute length of slip gauges.
13. Explain the term accuracy and precision.
14. With a neat sketch, explain the Hall effect.
15. Explain the seed back effect with a neat sketch.

(10 × 5 = 50 marks)

Part B

Answer **all** *questions.*
Each question carries 10 *marks.*

16. Describe in detail the different types of dynamic errors in a measurement system.

Or

17. Describe the precautionary measures to be taken at various stages of using slip gauges and explain mathematically why error in sine bar increases when the angle being measured exceeds 45°.

Turn over

18. Explain in detail Taylor's principle of gauging and explain in detail about any two limit gauge and its applications with a neat sketch.

Or

19. Figuratively state the construction of the Pitter-NPL flatness interferometer and explain its working principle.

20. Suggest the suitable measuring instrument used to measure the tooth thickness of a spur gear. Explain in detail about its procedure with an appropriate sketch.

Or

21. Explain in detail about the measurement of effective diameter of screw thread using floating carriage micrometer.

22. With neat sketches, explain the construction and working of LVDT. List the advantages and applications of LVDT.

Or

23. Describe the different modes of operation of piezo electric transducers.

24. Explain the application of flow meters used in flow measurement with appropriate definitions, principles and working methodology.

Or

25. Brief about:

    (i) Liquid in glass thermometer. (5 marks)

    (ii) Complete partial and total immersion thermometers. (5 marks)

[5 × 10 = 50 marks]

D 13444 (Pages : 4) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Mechanical Engineering

ME 19 504—MECHANICS OF MACHINERY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Classify the mechanisms based on degrees of freedom (DoF), if DoF is equal to, (i) one ; (ii) two ; and (iii) zero.
2. The dimensions of a four bar linkage is given by AB = 12 mm, BC = 30 mm, DC = 26 mm and AD (fixed link) = 32 mm. Find the transmission angle at any one extreme configuration.
3. Identify any one rocker-rocker mechanism used in automobile, draw the kinematic diagram and mention about any two salient characteristics.
4. The wheel 2 shown in Fig. 1, rotates at 600 rev/min CW and drives wheel 3 without slipping. Find the velocity difference between points B and A.

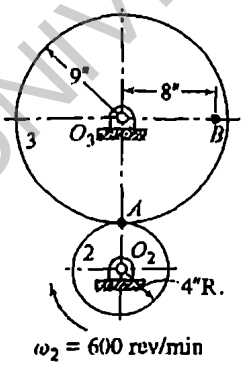


Fig. 1

5. Define and numerically illustrate the angular velocity ratio theorem of instantaneous centres.
6. Define Coriolis component of acceleration. In which cases does it occur ?
7. What is backlash in gears ? Brief the effect of backlash in power transmission.
8. Write short notes about helical gears.

Turn over

9. Draw the kinematic diagram of a simple planetary gear train and write the speed ratio.

10. Draw an appropriate follower displacement diagram for the following cases and specify the stroke of follower : (i) Dwell-Rise-Dwell-Return-Dwell, (ii) Dwell-Rise-Dwell.

11. Why radial follower is preferred over offset followers in cam and follower mechanism? Brief with simple sketch.

12. What are circular arc cams ? Write the expression for maximum velocity and acceleration of tangent cams with flat faced follower.

13. Differentiate the path generation synthesis and motion generation synthesis with an example.

14. A linkage is to be synthesized to generate a function $y = \sin x$, $0 \leq x \leq n$, where x and y are the input and output variables. Find the three precision positions of y within the specified range.

15. Define the term 'dyad'. Specify the use of dyad in graphical synthesis of planar linkages.

(10 × 5 = 50 marks)

Part B

Answer any **five** *questions.*
Each question carries 10 *marks.*

16. Identify the mechanisms that are obtained, if the crank in a slider crank chain is grounded. Also, describe about any one mechanism with simple sketch.

Or

17. Brief about any two straight line generators with simple sketch.

18. The four-bar linkage in the posture shown in Fig. 2 is driven by crank 2 at ω_2 = 45 rad/s ccw. Find the angular velocities of links 3 and 4. AO_2 = 50 mm, BA = 125 mm, O_4O_2= 125 mm, BO_4 = 150 mm.

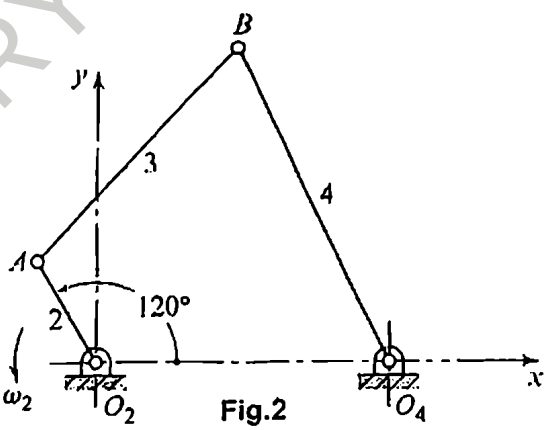


Fig.2

Or

19. Fig. 3, show the configuration of an engine mechanism. The dimensions are as follows : OA = 200 mm, AB = 600 mm. At the instant shown, the crank, OA has an angular velocity of 50 rad/s CW and an angular acceleration of 800 rad/s^2. Find the acceleration of the slider, B and the angular acceleration of the link, AB.

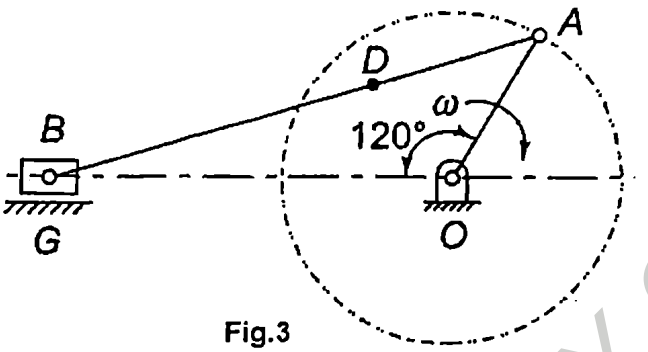


Fig.3

20. Find the contact ratio for two involute gears are in mesh. The following data is applicable : module = 6 mm, the pressure angle 18° addendum = 0.8 module, the number of teeth on pinion is 25 and that in gear is 50.

Or

21. Fig. 4 shows diagrammatically a compound epicyclic gear train. Wheels A, D and E are free to rotate independently on spindle C, while B and C are compound and rotate together on spindle P, on the end of arm OP. All the teeth on different wheels have the same module. A has 12 teeth, B has 30 teeth and C has 14 teeth cut externally. Find the number of teeth on wheels D and E which are cut internally. If the wheel A is driven clockwise at 1 rps while D is driven clockwise at 300 r.p.m., determine the magnitude and direction of the angular velocities of arm OP and wheel E.

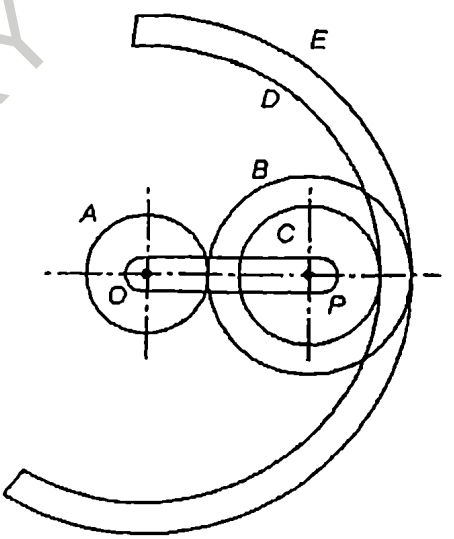


Fig.4

22. Draw the profile of a cam operating a knife edge follower having a lift of 30 mm. The cam raises the follower with SHM for 150° of the rotation, followed by a period of dwell for 60°. The follower descends for the next 100° rotation of the cam with uniform velocity, again followed by a dwell period. The cam rotates at a uniform speed of 120 r.p.m. and has a least radius of 20 mm. Also, find the maximum velocity and the acceleration of the follower during the lift.

Or

23. The follower of a tangent cam is operated through a roller of 50 mm diameter and its line of stroke passes through the axis of the cam. The minimum radius of the cam is 40 mm and the nose radius 15 mm. The lift is 25 mm. If the speed of the camshaft is 600 r.p.m., calculate the velocity and acceleration of the follower at the instant when the cam is in full lift position, and is at 20° from full lift position.

24. Design a four-bar mechanism for three precision positions, when the motions of the input and output links are governed by a function $y = 2x^2$ and x varies from 2 to 4 with an interval of 1. Assume θ to vary from 40° to 120° and Φ from 60° to 132°.

Or

25. Enumerate the procedure to synthesize a four-bar mechanism for two precision positions based on function generation using graphical approach.

(5 × 10 = 50 marks)

D 13443 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Mechanical Engineering

ME 19 503—HEAT AND MASS TRANSFER

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Define heat transfer and give its significance.
2. State Fourier's law of heat conduction and its significance.
3. Brief on critical thickness of insulation.
4. Describe Newton's law of cooling.
5. Differentiate between Film wise and Drop wise condensation.
6. Define dimensionless numbers and list any three dimensionless numbers involved in heat transfer.
7. Describe briefly abut Stephan Boltzmann law.
8. Explain shape factor and its significance.
9. Define the following terms : absorptivity, reflectivity and transmissivity.
10. Outline the classification of heat exchangers.
11. Briefly explain fouling and scaling of heat exchangers.
12. What is LMTD and give its significance ?
13. Describe briefly Fick's law of diffusion.
14. Explain about any two dimensionless numbers relating mass transfer principles.
15. Brief on steady-state unimolecular diffusion in liquids and gases.

(10 × 5 = 50 marks)

Part B

Answer **all** *questions.*
Each question carries 10 *marks.*

16. The root of an electrically heated home is 6 m. long, 8 m. wide, and 0.25 m. thick, and is made of a flat layer of concrete whose thermal conductivity is k = 0.8 W/m.K. The temperatures of the inner and the outer surfaces of the roof one night are measured to be 15° C. and 4° C., respectively, for a period of 10 hours. Determine (a) The rate of heat loss through the root that night ; and (b) the cost of that heat loss to the home owner if the cost of electricity is Rs.4.kWh.

Or

17. A furnace wall is composed of 220 mm. of fire brick, 150 mm. of common brick, 50 mm. of 85 % magnesia and 3 mm. of steel plate on the outside. If the inside surface temperature is 90° C., estimate the temperature between layers and calculate the heat loss in kJ/h.m.^{2} assume k (for fire brick) = 4 kJ/m.h.C, k (for common brick) = 2.8 kJ/m.h.C, k (for 85 % magnesia) = 0.24 kJ/m.h.C and k (steel) = 240 kJ/m.h.C.

18. Water is heated while flowing through a 1.5 cm. × 3.5 cm. rectangular tube at a velocity of 1.2 m/s. the entering water temperature is 40° C. and tube wall is maintained at 85° C. Determine the length of the tube required to raise the temperature of water by 35° C. Use the properties of water as follows : Density = 985.5 kg/m.^{3} ; k = 0.653 W/m.K, Dynamic viscosity = 0.517 × 10^{-6} m.^{2}/s ; Specific heat = 4.19 kJ/kg.K.

Or

19. A vertical cylinder 1.5 m. high and 180 mm. in diameter is maintained in 100° C. in an atmosphere environment of 20° C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean temperature as , density = 1.06 kg./m.^{3}, υ = 18.97 × 10^{-6} m.^{2}/s, Cp = 1.004 kJ/kg.C and k = 0.1042 kJ/m.h.C.

20. Discuss on the different laws of radiation in heat transfer and its significance.

Or

21. The effective temperature of the body having an area of 0.12 m.^{2} is 527° C. Calculate the following (i) the total area of energy emission ; (ii) the intensity of normal radiation ; (iii) the wavelength of maximum monochromatic emissive power.

22. Derive an expression for LMTD for single pass parallel flow heat exchanger.

Or

23. A counter flow heat exchanger is employed to cool 0.55 kg./s (Cp = 2.45 kJ/kg.C) of oil from 115° C. to 40° C. by the use of water. The inlet and outlet temperature of the cooling water are 15° C. and 75° C. respectively. The overall heat transfer coefficient is expected to be 1450 W/m.^{2} °C. Using NTU method, calculate the following (i) mass flow rate of water ; (ii) effectiveness of heat exchanger ; (iii) surface area required.

24. Derive an expression for steady-state diffusion through a cylindrical shell and write its assumptions.

Or

25. Derive an expression for steady-state unimolecular diffusion and equimolar counter diffusion in liquids.

(5 × 10 = 50 marks)

D 13442 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME] DEGREE EXAMINATION, NOVEMBER 2021

Mechanical Engineering

ME 19 502—MANUFACTURING PROCESS—II

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Explain in detail about the grain flow pattern in forging.
2. Explain the difference between Extrusion and drwing with a line diagram.
3. What are the various dies used in press working ?
4. Differentiate between forging and extrusion.
5. Explain flash less forging. What is the role of flash ?
6. Distinguish between hot forging and cold forging.
7. Express the important characteristics expected from a cutting tool material.
8. With the aid of a sketch, describe the resultant forces acting on the single point cutting tool in orthogonal cutting.
9. With the aid of a sketch, describe the temperature distribution in flank of a single point cutting tool when it is used for machinng a component.
10. Distinguish between Up milling and Down milling.
11. Give a simple sketch of a broaching tool and explain various elements.
12. Discuss the desirable properties of cutting tool materials.
13. Suggest five ways to reduce the friction between chip and tool during cutting process.
14. Briefly explain the steps involved in chemical machining.
15. Explain the distinction between Conventional and Non-Traditional Manufacturing Processes.

(10 × 5 = 50 marks)

Part B

Answer **all** *questions.*
Each question carries 10 *marks.*

16. Explain in detail about selection of cutting fluid based on work materials.

Or

Turn over

17. Explain in detail about any five machinng operations that can be performed using lathe with a neat sketch.

18. Explain the crank and slotted link mechanism used in shaper with neat sketch.

Or

19. Briefly explain sensitive drilling machine with neat sketch and list out its advantages and disadvantages.

20. Discuss the material removal mechanism in plasma arc machinng. Explain the working of air plasma torch giving a neat sketch.

Or

21. Explain in detail about the operating principle and applications of water jet machining.

22. Explain the process characteristics of sheet metal forming process.

Or

23. Explain the construction and operations of combination and progressive dies with a neat sketch.

24. Briefly explain open die forging and closed die forging and also state the advantages and disadvantages.

Or

25. Figuratively explain in detail about electromagnetic forming.

(5 × 10 = 50 marks)

D 13441 (Pages : 4) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

B.Tech.

EN 19 501—ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT

Time : Three Hours Maximum : 100 Marks

Section I

PART A

Answer any **four** *questions.*
Each question carries 5 *marks.*

1. Explain the law of diminishing marginal utility.
2. What are the assumptions of law of demand ?
3. Describe the factors which affect the price elasticity of demand for a commodity.
4. Explain the law of supply.
5. Write the significance of cash equivalents.
6. Is it possible for a cash balance to decrease when the company makes a net profit for any given period ? Explain.

(4 × 5 = 20 marks)

PART B

Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) Explain the various factors influencing Demand and Supply with example.

Or

(b) Analyze the various types of elasticity of demand and their usefulness.

2. (a) A person is planning a new business. The initial outlay and cash flow pattern for the new business are as listed below Table. The expected life of the business is five years. Find the rate of return for the new business :

Period	0	1	2	3	4	5
Cash flow Rs.	1,00,000	30,000	30,000	30,000	30,000	30,000

Or

(b) A company is planning to purchase an advanced machine centre. Three original manufacturers have responded to its tender whose particulars are tabulated as follows :

Manufacturer	Down payment Rs.	Yearly equal installment Rs.	No. of installments
1	5,00,000	2,00,000	15
2	4,00,000	3,00,000	15
3	6,00,000	1,50,000	15

(2 × 10 = 20 marks)

Section II

Part A

Answer any **six** *questions.*
Each question carries 5 *marks.*

1. Briefly describe the major contributions of Taylor in management principle policy.
2. What is meant by Delegation of Authority ?
3. Mention the various steps involved in process of controlling.
4. Illustrate the advantages and limitations of Planning.
5. Explain briefly the techniques useful while evaluating alternatives.
6. State the importance of engineering economics.
7. Why does the demand curve slope downwards ?
8. Describe briefly on time cost trade of in critical path method.
9. Define and describe the term, 'corporate social responsibility'.

(6 × 5 = 30 marks)

PART B

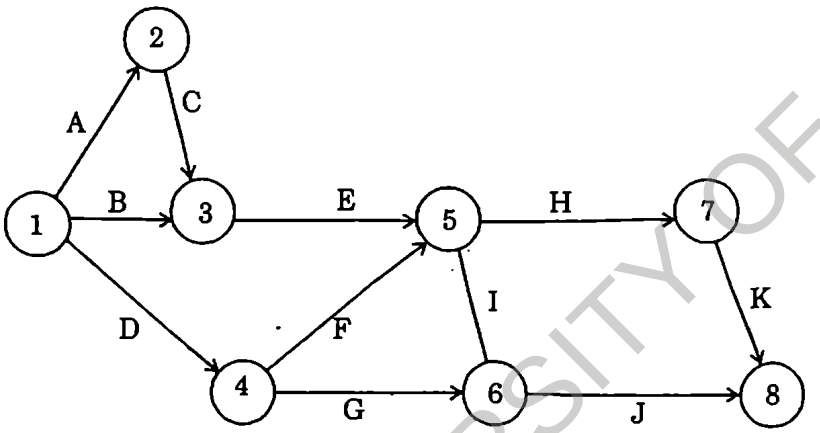
Answer **all** *questions.*
Each question carries 10 *marks.*

1. (a) What is Planning ? Discuss the various steps involved in Planning.

Or

(b) Explain the Planning Premises in detail and how it could be effective ?

2. (a) For the project :



Task	A	B	C	D	E	F	G	H	I	J	K
Least time	4	5	8	2	4	6	8	5	3	5	6
Greatest time	8	10	12	7	10	15	16	9	7	11	13
Most likely time :	5	7	11	3	7	9	12	6	5	8	9

Find the earliest and latest expected time to each event and also critical path in the network.

Or

(b) A project has the following times schedule :

Activity	(1–2)	(1–3)	(2–4)	(3–4)
Time (weeks)	4	1	1	1
Activity	(4–9)	(5–6)	(5–7)	(6–8)
Time (weeks)	5	4	8	1
Activity	(8–9)	(8–10)	(9–10)	
Time (weeks)	1	8	7	

Construct the network and compute the TE and TL for each event, Float for each activity and Critical path and its duration ?

3. (a) XYZ Ltd. is manufacturing and selling four types of products A, B, C and D. The fixed costs are Rs. 1, 50,000 per month. Calculate break-even point. The sales mix and variable costs are as follows :

	A	B	C	D
Product Sales per month	2,00,000	1,50,000	1,00,000	2,50,000
Variable Cost Ratio	50 %	50 %	75 %	40 %

Or

(b) A cost information computed by the cost accountant is as follows : Sales = 1,00,000 units Selling Price = Rs. 10 per unit Variable cost or out of pocket-costs = Rs. 6 per unit Fixed costs or burden = Rs. 60,000 per annum Compute the following :

a) Break-even points in units and value

b) Make a profit of Rs. 40,000

c) Make a profit of Rs. 2 per unit

d) Make a profit of 30 % on sales.

(3 × 10 = 30 marks)

D 13467 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Information Technology

IT 19 506 (A)—WEB AND INTERNET TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Write the format of HTML program.
2. Explain about list tag.
3. Explain the attributes of table tag with an example.
4. List the features of JavaScript.
5. Write a JavaScript program to find the Fibonacci series of a given number.
6. Give an overview of creation and initialization of arrays in JavaScript.
7. Explain the data types of PHP.
8. Write a simple calculator program in PHP using if-else statement.
9. Specify a PHP program to reverse the given number 23456.
10. Differentiate client and server application.
11. List the steps taken to send an electronic mail.
12. Explain the basic idea behind VoIP.
13. Elaborate the process of streaming stored audio and video in multimedia networking.
14. Summarize the security problems exist on the internet.
15. Outline the different functional components of integrated services architecture.

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. a) Explain in detail about the Origins and Evolution of HTML and XHTML.

Or

b) Describe how the text content of an XHTML document can be formatted with XHTML tags.

17. a) Illustrate various objects and methods in JavaScript with examples.

Or

b) Demonstrate the usage of switch and do-while statements in JavaScript.

18. a) Give a brief overview of server-side scripting language PHP. Write a simple PHP program to count the vowels, digits and spaces in a string.

Or

b) Enumerate the differences between echo and print with examples. How to show alphabets in ascending and descending order in PHP using while loop ?

19. a) Illustrate the sequence of socket functions called by a client and server with diagram.

Or

b) Elaborate the characteristics of file transfer protocol and specify the interaction of FTP connections in a typical session with diagram.

20. a) Explain the significance network management in internet.

Or

b) Discuss the two approaches of QoS services and explain internet QoS technologies.

(5 × 10 = 50 marks)

D 13466 (Pages : 2) Name.....

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FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Information Technology

IT 19 505—SOFTWARE ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*

Each question carries 5 *marks.*

1. Identify six different phases of a classical waterfall model with diagram.
2. What is the need for a prototype in a software development ?
3. Explain the role of system analyst in requirements gathering.
4. List the items that are designed and documented during design phase.
5. Explicate the shortcomings of DFD models.
6. In what ways, a structure chart differs from a flow chart ?
7. Explain the types of software documentation.
8. Enumerate the general guidelines for effective debugging.
9. What are three types of system testing ? Differentiate among them.
10. Mention the characteristics of software maintenance of software products.
11. What is ISO 9000 certification ? Specify the three standards of ISO 9000.
12. List the five maturity levels of capability maturity model.
13. What is functional point metric ? Mention the steps to compute functional point metric.
14. Specify the quantities used for the calculation of critical path method.
15. List the characteristics of CASE tools.

(10 × 5 = 50 marks)

Part B

Answer one full section from each question.

Each question carries 10 *marks.*

16. (a) Outline the basic idea with principles and drawbacks of agile development models.

Or

(b) Explain the significance of SRS document in categorizing user requirements.

17. (a) Discuss the role of structured analysis and structured design in performing high-level design of software.

Or

(b) Design level 0 and 1 DFD for safe home software.

18. (a) What is integration testing ? Explain the types of integration testing approaches.

Or

(b) Summarize the debugging approaches of programmers and outline the approaches to design black box test cases.

19. (a) With a neat sketch, explain the various activities involved in the process of software reverse engineering.

Or

(b) How can the maintenance cost of a typical software product be estimated ? Explain the registration process of ISO 9000 certification.

20. (a) Explain COCOMO 2 model in detail.

Or

(b) Describe the support of CASE tools in software development life cycle.

(5 × 10 = 50 marks)

D 13465 (Pages : 3) Name.....

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FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Information Technology

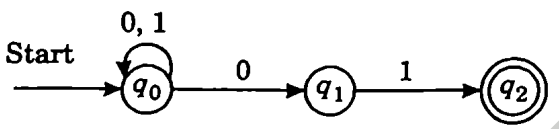
IT 19 504—THEORY OF COMPUTATIONS

Time : Three Hours Maximum : 100 Marks

Part A

Answer **eight** *questions.*
Each question carries 5 *marks.*

1. Explain the need for automata theory in Computer Science.
2. Define five-tuple Deterministic Finite Automaton.
3. Construct transition table for the given NFA :



4. Give a regular expression for the following :
   (i) Set of all strings having odd number of 1's.
   (ii) Set of all strings ending in 00.
5. What are the closure properties of regular languages ?
6. Show the equivalence of two regular expressions (0*1*)* and (0 + 1)*.
7. Let G = (N, T, P, S), P = {S → A1B/a, → 0A/$\in$, B → 0B/1B/$\in$} give a leftmost and rightmost derivation for the string 00101.
8. Enumerate the differences between NFA and PDA.
9. What are the different ways of language acceptances by a PDA and define them.
10. Define Turing Machine. State the features of Turing Machine.
11. When a language is said to be recursive and recursively enumerable ?
12. Explain briefly about subroutines in Turing Machines.

13. Elaborate the types of polynomial time reductions.

14. How do you prove that the Post Correspondence problem is undecidable ?

15. Write short notes on tractable and intractable problems.

(10 × 5 = 50 marks)

Part B

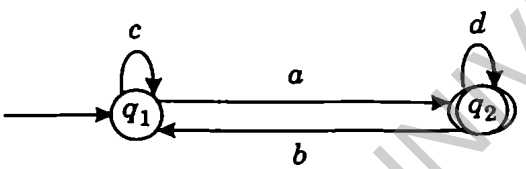
Answer **one full** *section from each question.*
Each question carries 10 *marks.*

16. (a) Prove that $1^2 + 2^2 + 3^2 + ... + n^2 = \frac{n(n+1)(2n+1)}{6}$ by mathematical induction for all $n \geq 1$.

Or

(b) Construct a deterministic finite-state automaton that recognizes the set of all bit strings that begin with two 0s.

17. (a) Convert the given finite automata into regular expression.



Or

(b) State and explain the algebraic laws of regular expressions.

18. (a) Construct a PDA accepting by empty stack the languages $\{a^m b^m c^n \mid m, n >= 1\}$ and find PDA for the given grammar S → 0S1 / 00 / 11.

Or

(b) Find a grammar in Chomsky Normal Form equivalent to S → AB / aB, A → aaB / ε , B → bbA form.

19. (a) Construct a TM for the language L = $\{0^n1^n2^n\}$ where $n \geq 1$.

Or

(b) Discuss in detail about restricted Turing Machines.

20. (a) State and prove Rice's theorem.

Or

(b) Compare the features of P, NP and NP-complete classes of problems with examples.

(5 × 10 = 50 marks)

D 13464 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Information Technology

IT 19 503—DATABASE MANAGEMENT SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Elaborate the characteristics of database approach in detail.
2. Explain the categories of data models.
3. Specify the two main processes for defining superclass/subclass hierarchies.
4. State the concept of domain, attributes, tuples and relations.
5. Differentiate tuple and domain relational calculus.
6. Express a query to fetch maximum salary of Employee and minimum salary of Employee together from Employee table.
7. Explain the significance inclusion dependencies on relations.
8. State the inference rules for functional dependencies.
9. Explain the relationship between five normal forms.
10. Enumerate the reasons for transaction failures during execution.
11. Explain lock and unlock operations for binary locks.
12. Outline the two techniques for database recovery.
13. What are the issues addressed by database security ? Explain.
14. Mention the factors that can cause sensitivity to data.
15. List the characteristics of data warehouses.

(10 × 5 = 50 marks)

Turn over

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. (a) With a neat sketch, explain three schema architecture for database systems.

Or

(b) Compare traditional file processing with Database Management Systems.

17. (a) Consider the table :

Student (Student ID, Stu_Name, Stu_Subject_ID, Stu_Marks, Stu_Age)

(i) Write a query to access the last record from the table.

(ii) Write a query in SQL to retrieve only even rows from the table.

(iii) Write a query in SQL to create a new table with the same data and structure as an existing table.

(iv) Write a query in SQL to show the record of the three highest marks from the Student table.

(v) Write a query in SQL to show all the record of those students whose marks is greater than 82 and age is 22.

Or

(b) Illustrate the steps involved in ER-to-relational mapping.

18. (a) Explain the algorithms for relational database schema design in detail.

Or

(b) Explain briefly about multi-valued and joined dependencies for relational databases.

19. (a) Describe the problems associated with the use of locks and show how these problems are handled in concurrency control protocols.

Or

(b) Discuss in detail about shadow paging and ARIES recovery algorithm.

20. (a) Give a brief overview on distributed databases.

Or

(b) Elaborate object oriented and object relational databases in detail.

(5 × 10 = 50 marks)

D 13463 (Pages : 4) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME] EXAMINATION, NOVEMBER 2021

Information Technology

IT 19 502—SIGNALS AND SYSTEMS

Time : Three Hours Maximum : 100 Marks

Part A

Answer any **ten** *questions.*
Each question carries 5 *marks.*

1. Explain Continuous and Discrete time signals with suitable diagram.
2. Explain the Properties of Convolution-Summation.
3. Explain about the impulse response in Continuous Signals.
4. Explain about the basics of Trigonometric Form of Fourier Series of a periodic signal $x(t)$, with period T.
5. Illustrate the concept of Odd symmetry.
6. Explain the concept of Frequency Spectrum of Periodic Continuous Time Signals.
7. Define Laplace transform. Explain the concept of Bilateral Laplace transform.
8. Explain about the Region of Convergence (ROC) for a Right sided (casual) signal.
9. Determine the Laplace transform of continuous time signal $x(t) = A\,u(t)$ and fid its ROC.
10. Explain about Fourier Series of Discrete Time Signals.
11. State the Difference Between Continuous Time and Discrete Time Fourier Series.
12. Illustrate the concept of Frequency Spectrum of Periodic Discrete Time Signals.
13. Define Z-Transform. Also, Explain about One sided Z-Transform.
14. State and Explain Final value theorem in Z-Transform.
15. Explain the Time Shifting property of DTFT.

(10 × 5 = 50 marks)

Part B

Answer **one** *full section from each question.*
Each question carries 10 *marks.*

16. (a) Explain in detail about :

(i) *Periodic and Aperiodic Signals.*

(ii) *Energy and Power Signals.*

(iii) *Even- and Odd-symmetric Signals.*

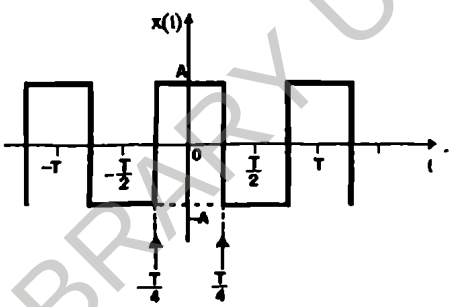
Or

(b) Given the differential equation of a system, with output $y(t)$ and input $x(t)$, determine whether the system is linear. Assume that the initial condition $y(0)$ is :

$$y(t) = x(t) + t\frac{dy(t)}{dt}$$

$$y(t) = x(t) + \left(\frac{dy(t)}{dt}\right)^2.$$

17. (a) Determine the trigonometric form of Fourier series of the wave form shown in figure :



Or

(b) Determine the Fourier transform of following continuous time domain signals :

$$x(t) = 1 - t^2 \; ; \text{ for } |t| < 1$$
$$= 0 \quad ; \text{ for } |t| > 1.$$

18. (a) Determine Laplace transform of periodic square wave shown in Figure :

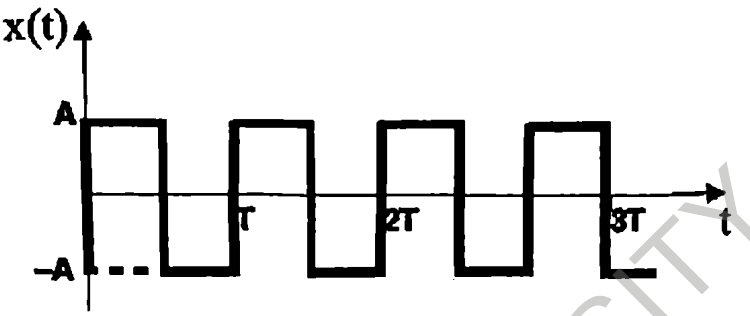


Figure 4

Or

(b) Determine the poles and zeros of the rational function of s given below. Also sketch the pole-zero plot.

$$X(s) = \frac{(s+1)\left(s^2 + 10s + 41\right)}{(s+4)\left(s^2 + 4s + 13\right)}.$$

19. (a) Determine the Fourier series representation of the following discrete time signal and sketch the frequency spectrum. X (n) = {....., 1, 2, – 1, 1, 2, – 1, 1, 2, –1,.....}

Or

(b) Determine the Nyquist sampling frequency and Nyquist interval for the signal,

$$x(t) = \left(\frac{\sin 200\,\Pi t}{\Pi t}\right)^2.$$

20. (a) Determine the inverse Z-transform of the function, $X(z) = \dfrac{3 + 2Z^{-1} + Z^{-1}}{1 - 3Z^{-1} + 2Z^{-2}}$ by Residue Method.

Or

(b) Determine the Z-transform and their ROC of the Signal $x(n) = u(n)$

(5 × 10 = 50 marks)